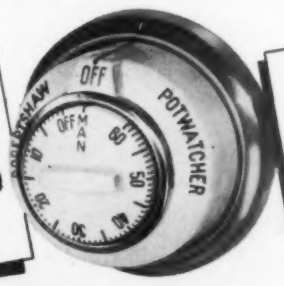
96th Year
AUGUST 195
Vol. 181—No. 2

AMERICAN Gas Journal

NOW THE 2 NEWEST, MOST IMPORTANT GAS RANGE SALES FEATURES SINCE OVEN HEAT CONTROL!

NEW Robertshaw®
POTWATCHER®
—it turns off top burner AUTOMATICALLY!

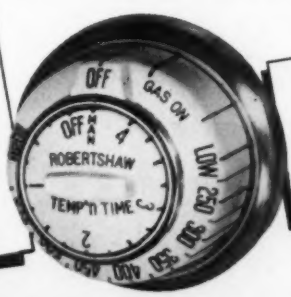
It's a watch—controlled 60-minute timer



It's a gas valve

NEW Robertshaw
TEMP'N TIME®
—it turns off oven AUTOMATICALLY!

It's a watch—controlled 4-hour timer



It's an oven thermostat

COMPLETE PROMOTIONAL HELPS available, including national advertising, point-of-sale material, newspaper ad mats, consumer booklets, etc. *Ask your range manufacturer!*

Mr. Controls

Robertshaw-Fulton CONTROLS COMPANY

ROBERTSHAW THERMOSTAT DIVISION, Youngwood, Pa.

THE Newest METHOD IN PIPE CONNECTIONS

SAFETY-SEAL WELD SLEEVES
PERMA-SEAL CORROSION CONTROL SLEEVES
and LEAK CLAMPS

for steel to steel, steel to cast iron, cast iron to cast iron, leak clamps, and completely insulated sleeves for corrosion control.

WELDED SLEEVE

PERMA-SEAL SLEEVE

LEAK CLAMP

Here's a complete new system for making pipe connections of all types in the gas field.

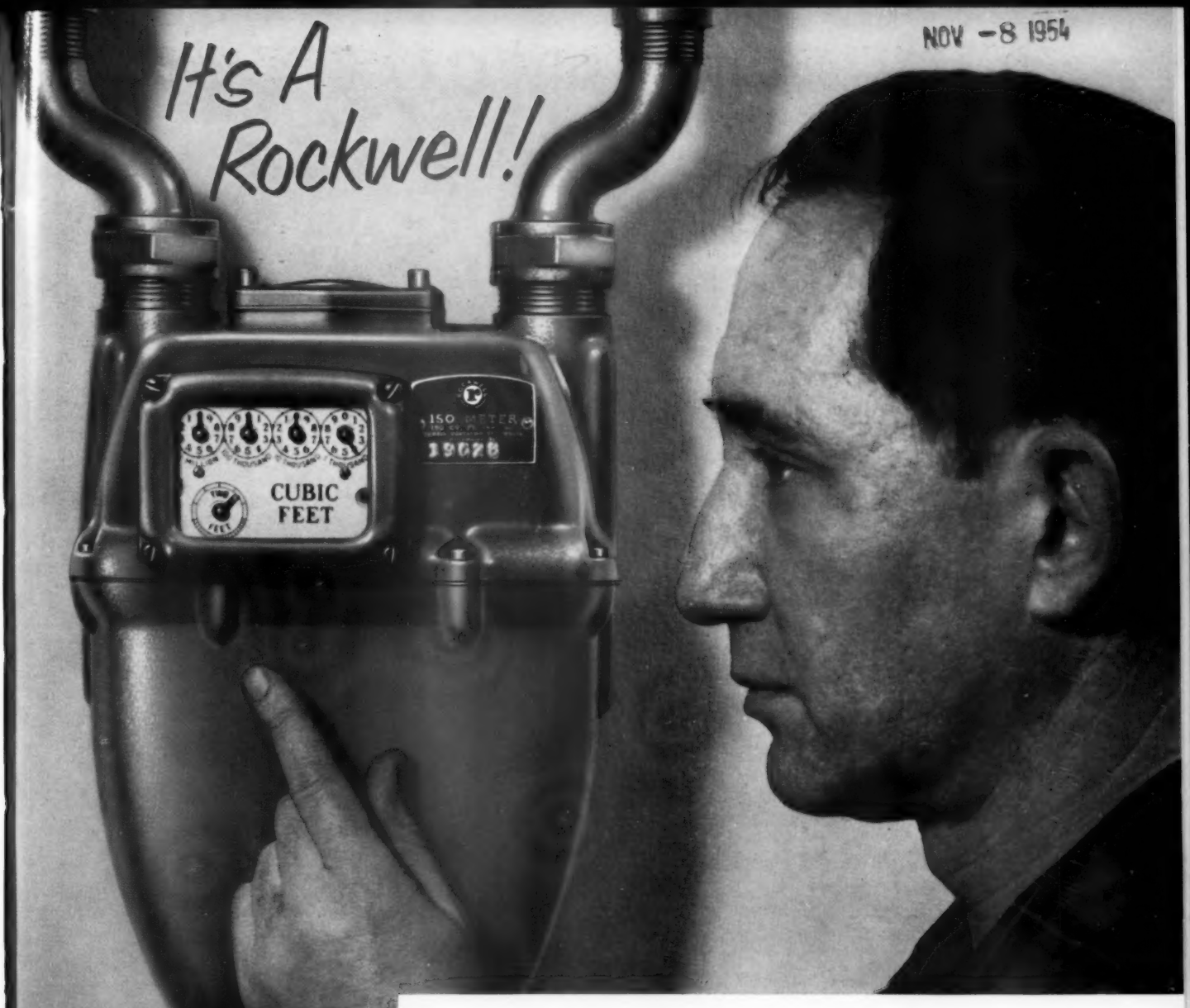
- For steel to steel connections, these sleeves will withstand pressures up to 100 pounds before welding. No flanges, bolts, collars, or rings to obstruct in the final wrapping.
- Where welding is not practical such as cast iron to steel, a new compound that cures to a tough substance is used. It forms ***a complete seal by adhesion to the pipe.*** Where this compound is used for making connections it also makes a 100% insulated sleeve for corrosion control.
- A new leak clamp of simple construction that does not require adjustment or filling and facing of the bell. The clamp acts as mold and retainer for the new compound and thus becomes a part of the molded joint allowing for movement and vibration of pipe without disturbing the joint.

Now in actual service for over a year, these new methods will relieve many of the problems in the gas industry. WRITE FOR FURTHER INFORMATION AND PRICE LISTS.

UNITED PIPE UTILITY SUPPLIERS, INC. • BOX 777, BELOIT, WISCONSIN

AMERICAN GAS JOURNAL, August, 1954. Vol. 181, No. 2. Published monthly (except October, then semi-monthly), by American Gas Journal Inc., at 73 Main Street, Brattleboro, Vt. Entered as second class matter January 24, 1950, at the post office at Brattleboro, Vt. under Act of March 3, 1879. Executive and editorial offices at 205 East 42nd St., New York 17, New York. Subscription prices, U.S. $3 per year; Canada $4; Foreign $10. Single copies 50 cents, except October 1 issue, which is not sold separately. Printed in U.S.A.

NOV -8 1954



It's The Easiest To Handle, Install, Service

Rockwell aluminum meters are now made in six different sizes having a capacity range of from 150 cfh to 800 cfh. All bring you the benefits of light weight to ease shipping, handling and setting problems. All have the bowl type body. And all feature a removable and interchangeable valve plate mechanism that speeds and simplifies servicing. The modern eye appealing appearance of Rockwell aluminum meters builds consumer acceptance and confidence in the accuracy of your measurement. Write for full details.

ROCKWELL Aluminum METERS

For The Big Pay-Off

IN REVENUE, SERVICE, SATISFACTION

Manifold installation of Rockwell Pressed Steel Meters. All lines are controlled by Rockwell-Nordstrom Valves.

These Rockwell Gauges Convert High Pressure Measurement To Base Volumes.

THE EMCORECTOR
Gives a direct reading of metered volume corrected to contract base pressure irrespective of line pressure fluctuations. It eliminates all calculations; gives exact measurement — quick!

COMBINED RECORD GAUGE
Provides chart pressure records from which can be calculated the metered volume corrected to any contract base pressure. Both meter and clock driven types available.

YOU CAN RELY ROCKWELL ON ROCKWELL

ROCKWELL IS YOUR BEST BIG METER BUY . . . *All Ways!*

Rockwell No. 4½ and 5 meters are patterned after the best in structural steel construction. They are built around a strongly reinforced all-welded frame. A rugged valve plate casting provides rigidity and a firm foundation for the working mechanism. Pressed steel construction gives great impact strength, yet these meters are comparatively light in weight.

The tall slender lines permit manifolding within a limited ground or floor area to measure extra large loads. Team them with Rockwell regulators and Nordstrom valves for the utmost in service economy. *Write for literature.*

ROCKWELL MANUFACTURING COMPANY
PITTSBURGH 8, PA. Atlanta Boston Chicago Dallas Houston Kansas City, Mo. Los Angeles New York Philadelphia Pittsburgh San Francisco Seattle Tulsa
In Canada: Peacock Brothers Limited

There's a ROCKWELL METER and REGULATOR for every use

METERS

REGULATORS

AMERICAN Gas Journal
96TH YEAR OF PUBLICATION

VOLUME 181 AUGUST 1954 NUMBER 2

This month...

New, in our July issue, a broader coverage of the many fine technical presentations that are made before various gas industry groups. "Current Gas Industry Topics" is the general heading under which condensations of those presentations will appear. For those readers who may want details beyond our space limitations, the source of information will be given at the end of each Topic.

• • •

Just as with the weather, everybody talks about prices—and rates—so we inaugurated another new feature last month, "Retail Price Indexes of Gas, Other Fuels and Electricity." These indicators will appear monthly.

And, while we note what's-new-in-the-GAS JOURNAL, we'll certainly refer to page 4, in both this issue and last. MCF is its title; brevity, pertinence and interest are its objectives.

• • •

Corrosion problems and protective practices have been receiving more and more attention throughout the gas industry; conference- and convention-programs present the most recent advances. For our own part, the subject will continue to be important as later developments can be brought to our pages. The importance of placement of reference electrodes is a FEATURE this month on page 16. We are pleased, indeed, to welcome Messrs. Sudrabin and Lehmann, experts in the field of protective practices, to the roster of GAS JOURNAL authors.

• • •

Gas appliances in the news: the Gas Appliances Manufacturers Association program of informing homeowners about the position of gas appliances in modern living has completed another effective project, this one in direct cooperation with American Gas Association. See some of the results on page 47.

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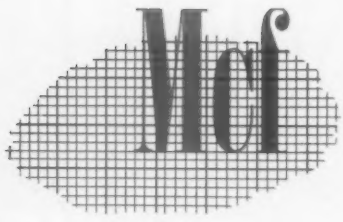

PRODUCERS of natural gas are dragging feet on business of getting information about sales contracts filed with Federal Power Commission, in line with Order 174. They might just as well face it; order stems from Supreme Court decision and Congress certainly isn't going to rush a bail-out-amendment to Natural Gas Act. FPC did not and presumably does not want jurisdiction back to producer. Commission has no choice; producers have no choice; it's the law. Information deadline still is October 1.

EXTRA $300,000 for FPC work involved in complying with Supreme Court's decision on Phillips case . . . producers under FPC jurisdiction . . . requested from Congress by President. Appropriation opposed by Sen. Johnson (D., Tex.) with comment, "decision has already caused consternation throughout the industry. An appropriation to enforce it at this point would merely add to the confusion and chaos." Committee went along; mixed the funds.

HINSHAW amendment exemptions from FPC jurisdiction for *intra*state gas companies simplified, since last issue, to affidavit certifying intrastate character of company business. However, companies have responsibility for notifying FPC of changed operations that come under FPC's regulatory scope. Broadly, that is business conducted across state lines. Be sure, either way; see Docket R-136, Order 137.

LONG-term view dictates advisability of watching research in synthetic fuels. Coal and oil shale undergoing laboratory and pilot-plant studies. Bureau of Mines reports progress. Remember: much coal in ground, conventional demand down, industry behind exhaustive search for new methods-new products. Underground gasification of coal in Alabama expected to resume with government funds financing tests.

CONFIDENCE, essential business factor, becoming stronger . . . because . . . unemployment seems to be steadying . . . employment turning up . . . new orders showing worthwhile upswing . . . construction contract awards continue setting new records . . . governmental spending remains at high levels.

CONTRAST in AGA advertising: For drably-unattractive and poorly-produced ad, see *Newsweek*, July 19, page 62; for starkly attractive, smart and colorful ad, see *Better Homes & Gardens*, July, page 97.

CREDIT easing is indicated for continuation by Federal Reserve Board's recent announcement of reduction in portion of deposits that member banks must keep on reserve with FRB. That releases more than $1-billion of reserves; the potential bank credit expansion is 5-to-6 times that amount. Other sources say: consumer-credit still upping in June for 3d month. Less apprehension about jobs and income; more buying.

INDUSTRIAL production advanced in May, with almost all major industry groups in on the act. Cleveland Trust Company's index set the level at 1.5% higher than in April.

UNDERGROUND gas storage facing more legislative hamstringing in the guise of mine safety, with the coal gang still pitching. Douglas-Dirksen Bill (S. 525) isn't going anywhere in this congressional session; but look for that proposed amendment to Natural Gas Act to come back vigorously next session. Bill provides essentially same bars on underground storage that were so roundly defeated in Pennsylvania through aroused public reaction responding to well-planned-and-activated gas industry information. Dust off the techniques—add some—just in case!

WATCH homebuilding activities; they are maintaining a livelier-than-predicted pace. Gas companies would be well-advised to keep these activities under constantly active surveillance . . . thereby avoiding *more* areas or even individual houses with no gas service. Residential contract data, by F. W. Dodge Corp., for 37 eastern states show 6-months' jumps of 17% in family units and 22% in dollars—over last year. Gains mainly in 1-family jobs, for sale-or-rent—which means "speculative."

ADVERTISING managers, note: Post Office is taking long, official (and appreciative?) looks at nude art. Drag out the drapes!

CORPORATIONS in 25 manufacturing and service groups, aggregating 660 firms, reported ½-year net incomes that averaged 2% over 1953 period, National City Bank reports. Changes ranged from *minus* 64% . . . textiles and apparel . . . to *plus* 35% . . . automobiles and trucks. 57 electric power and gas companies averaged *plus* 7%.

STORAGE gas first in the interruptible classification . . . that was principle retained by FPC in decision on Panhandle Eastern's proposed cancellation of interruptible rate schedules.

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MUELLER®

New NO-BLO STEEL VALVE

serves as a Curb Stop, Meter Stop or Control Valve

H-17900 Steel Valve — Size 1"

Now this one fitting is adaptable to all these applications. The new Mueller No-Blo Steel Valve has horizontal inlet and outlet — allows easy "straight line" connections. Available with a variety of inlet and outlets (1" butt weld, ¾" socket weld, ¾" inside I.P., 1" outside I.P.), it has the flexibility to meet all types of distribution system requirements.

Built for operating pressures up to 1200 psig, the forged steel body has a heavy-duty Silicon Bronze stem which is highly resistant to corrosion. "O" ring seals around stem and cap make the Steel Valve permanently leakproof — requires no maintenance.

H-17950 Capped Steel Valve—Size 1"

NO-BLO

The Capped Steel Valve is another new addition to the Mueller No-Blo line. Carrying the same features as the Steel Valve, the Capped Steel Valve employs an unique "O" ring inner valve mechanism concealed under the cap, making it virtually "tamperproof". This feature makes it perfectly suited for outside meter settings or other exposed locations.

To obtain more information on the Steel Valve and Capped Steel Valve, consult your Mueller Representative or write direct.

MUELLER CO.

Dependable Since 1857

MAIN OFFICE & FACTORY DECATUR, ILLINOIS

MUELLER

NO-BLO

Method

ALLOWS YOU TO MAKE HIGH PRESSURE GAS CONNECTIONS

Safely-

STEP 1. **WELD!** WELD FITTING TO MAIN AND/OR SERVICE LINE. TEST. NOW THREAD MUELLER H-10916 (HIGH PRESSURE) STEEL GATE VALVE TO FITTING.

with the MUELLER "D

STEP 3. **PLUG!** ATTACH COMPLETION PLUG VALVE STEM AND BUSHING, OR VALVE STEM, DEPENDING ON THE FITTING BEING USED, TO INSERTING TOOL ON H-17145 COMPLETION MACHINE. ATTACH COMPLETION MACHINE TO GATE VALVE...OPEN GATE VALVE AND INSERT.

Service Tee

The Mueller No-Blo Service Tee with welding or threaded inlet and welding, threaded or extended outlet—used for making connections under pressure where a valve is not required but a means of future stop-off is desired. Sizes ¾" through 2".

Service Valve Tee

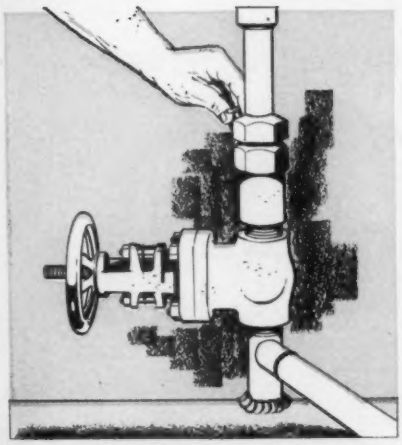
The No-Blo Service Valve Tee has welding or threaded inlet and welding, threaded or extended outlet. Equipped with an integral valve which can be closed for shut-offs. Sizes ¾" through 1¼".

Curb Valve Tee

The No-Blo Cu Valve Tee with we ing or threaded in and welding threaded outlet used as a contr valve or main co nection for operati pressures up to 12 psig. Sizes 1" throu 2".

STEP 2. **DRILL!** ATTACH "DH2" DRILLING MACHINE TO GATE VALVE. DRILL HOLE IN LINE. RETRACT BORING BAR AND CLOSE VALVE. OPEN BLEEDER VALVE TO RELIEVE PRESSURE. REMOVE DRILLING MACHINE.

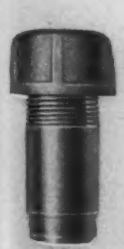
"DH2" DRILLING MACHINE



STEP 4. **COMPLETE!** OPEN BLEEDER VALVE ON BOTTOM OF COMPLETION MACHINE TO CHECK FOR TIGHT SHUT-OFF. THEN REMOVE EQUIPMENT AND INSTALL COMPLETION CAP.

The "DH2" Drilling Machine drills from ¼" through 2¼". Boring bar travel is 14". Maximum working pressure is 1200 psi at 100° Fahrenheit. Maximum working temperature is 500° Fahrenheit at 1000 psi. The "DH2" may be hand-operated or power-operated with the H-600 Air Motor or H-602 Gasoline Engine Drive Unit. Tools may be fed manually or automatically.

For additional information on the "DH2" and related No-Blo Fittings, consult your Mueller Representative, "DH2" Catalog, or write direct.



ave-a-Valve" illing Nipple

e No-Blo "Save-a-alve" Drilling Nip-e with welding inlet d threaded outlet used for temporary nnections. Gate lve is removed and ved when connec-n is abandoned.

Line Stopper Fitting

The No-Blo Line Stopper Fitting—used to make stop-off on service line or main, permitting repair or replacement of the line without shutdown or loss of gas.

Extension Stopper Fitting

The No-Blo Extension Stopper Fitting—used in new construction to make provision for future deadend extension or lateral extension.

Steel completion caps furnished on request for installations on lines carrying up to 1200 psig.

MUELLER CO.

Dependable Since 1857

MAIN OFFICE & FACTORY DECATUR, ILLINOIS

This is another of a series showing the broad application of Mueller No-Blo Fittings and Machines used for their installation.

FISHER®
TYPE 99L
2" SCREWED CONNECTIONS, HI-TENSILE IRON, STEEL OR BRONZE BODY.
TYPE 99LA
2" 125 LB. or 250 LB FLANGED IRON BODY O-RING INNER VALVE SINGLE OR DOUBLE PORTED
TYPE 99H
2" SCREWED CONNECTIONS, HI-TENSILE IRON, STEEL OR BRONZE BODY.

FISHER GOVERNOR

LEADS THE INDUSTRY IN RESEARCH FOR

Type 99

SCREWED or FLANGED CONNECTIONS

MULTI-PURPOSE PRESSURE REDUCING GAS REGULATOR

The Fisher Type 99 is truly a *multi-purpose regulator*—its versatility makes it adaptable to hundreds of applications now requiring an assortment of several types of regulators. It's as *handy* and *useful* as an extra vest pocket.

Because of its unexcelled performance and wide range of application, it is the ideal regulator to always have in stock.

For complete details, write for Fisher Bulletin P-99B.

FEATURES

- **Factory pre-set spring provides powerful lock-off action.**
- **Large, effective area of main diaphragm in combination with relay pilot assures trouble-free accuracy.**
- **2" threaded or flanged inlet and outlet. Hi-tensile iron, steel and bronze bodies for inlet pressures up to 250 PSI.**
- **Composition valve disc or O-Ring inner valve construction assures tight shut-off on zero flow and excellent regulation from no flow to maximum capacity.**

TYPE 99HF
2" 125 LB. OR 250 LB. FLANGED IRON OR 150 LB. OR 300 LB. FLANGED STEEL BODY.
TYPE 99F
HAS LOW PRESSURE PILOT

CAPACITY:

2" SCREWED CONNECTIONS
2" FLANGED CONNECTIONS TYPE "F" BODY
99,000 CFH at 100 PSI Inlet Pressure
2" FLANGED CONNECTIONS TYPE "A" BODY SINGLE PORTED
68,000 CFH at 40 PSI Inlet Pressure (Max.)
2" FLANGED CONNECTIONS TYPE "A" BODY DOUBLE PORTED
185,000 CFH at 100 PSI Inlet Pressure (Max.)

VERSATILITY:

For engine fuel systems, for industrials and for gas distribution systems.

PILOTS:

Low Pressure — 3 springs — 4 oz. to 2 PSI;
2 PSI to 10 PSI;
10 PSI to 20 PSI.
High Pressure — H Pilot — 10 PSI to 65 PSI;
HH Pilot — 35 PSI to 100 PSI.

COMPANY Marshalltown, Iowa

FISHER Since 1880

BETTER GAS PRESSURE CONTROL

With 100 years

Courtesy, Mobile Chamber of Commerce

This is Mobile, Alabama, known as the "City of Six Flags"

Bettmann Archive

This is Mobile as it looked shortly before Mobile Gas Service Corp. was founded over a century ago.

MODERNIZED cast iron

of EXPERIENCE...
they must be right

MOBILE...installed cast iron gas mains 100 years ago... and installs them today!

Mobile, Alabama, gives due credit for its growth in population and industrial expansion to the progressive management of Mobile Gas Service Corp. A century ago, when the first cast iron distribution mains were laid, the population was about 30,000. Today, 405 miles of mains are required to service Mobile's quarter-million population. Nearly all are cast iron mains *(see cut)*.

A customer who buys your product year after year—generation after generation—is a "jewel beyond price". Be you merchant or manufacturer, you might count such customers on the fingers of your two hands. Yet, the cast iron pressure pipe industry can count more than 60 of them — utilities that have been buying cast iron pipe for water or gas mains (or both) for 100 years.

Today's *modernized* cast iron pipe—centrifugally cast and with standardized mechanical joints—is even more economical and efficient. The pipe is stronger, tougher, more uniform in quality. The mechanical joints are bottle-tight for usual gas pressures and for all types of gas.

Cast Iron Pipe Research Association, Thos. F. Wolfe, Managing Director, 122 So. Michigan Avenue, Chicago 3, Ill.

CAST Q IRON ®

The Q-Check stencilled on pipe is the Registered Service Mark of the Cast Iron Pipe Research Association.

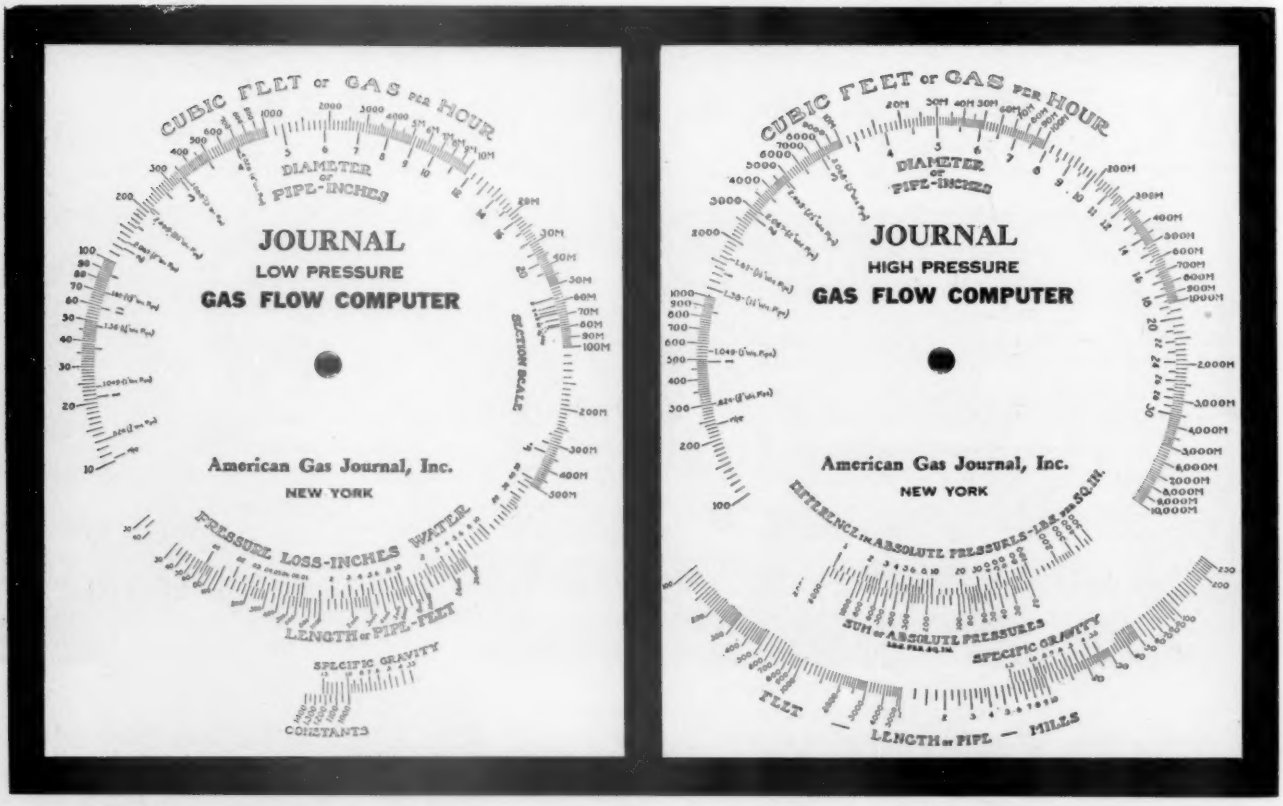
In good condition after 100 years of service, this cast iron distribution main is still functioning in Mobile, Ala.

pipe FOR MODERN GAS DISTRIBUTION

AMERICAN

Gas Journal

GAS FLOW COMPUTERS



FOR LOW PRESSURES

Cubic feet of gas per hour.....10 to 500M

Pipe diameters.....¾" to 48"

Pressure loss (inches)..... .01 to 10

Specific gravities.....1.5 to .35

Constants.....1400 to 1000

Pipe length (feet).....30 to 30,000

FOR HIGH PRESSURES

Cubic feet of gas per hour.....100 to 10MM

Pipe diameters.....¾" to 30"

Difference in absolute pressure to.....500 psi.

Sum of absolute pressures.....20 to 2,000 psi.

Specific gravities.....1.5 to .35

Pipe length (feet).....100 to 5,000

Pipe length (miles).....1 to 250

The computers are printed on heavy durable plastic, enclosed in Fabrikoid cases with complete instructions for their use.

PRICE: $5.00 EACH

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AMERICAN Gas Journal

205 EAST 42 STREET—NEW YORK 17, NEW YORK

remember!

ONE SERVEL SALE

means a

Double Profit for You!

1 SERVEL, the Gas Refrigerator, is different because it's the only refrigerator that makes ice cubes without trays and puts them in a basket... all automatically! The only refrigerator with no moving parts in its freezing system... stays silent, lasts longer. Only SERVEL Gas Refrigerators offer a ten year warranty... the longest and strongest warranty you'll find. No other refrigerator in the world has these outstanding sales advantages.

2 SERVEL, the Gas Refrigerator, forges the final link for the all gas kitchen... safeguards domestic load! The amazing, profitable SERVEL is also a constant source of steady, day-in and day-out revenue throughout the year. The SERVEL Gas Refrigerator with all its outstanding features will not only maintain that gas kitchen load but will further popularize gas... the modern fuel.

no messy ice trays!

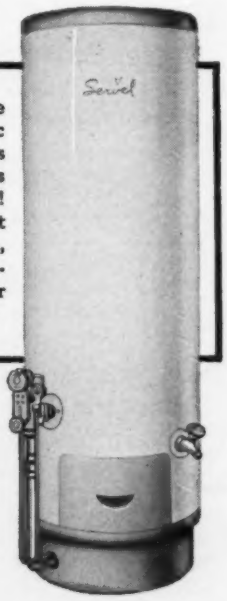
Simply pick the dry, loose, super-cold IceCircles out of the basket. The new Servel refills itself, then turns off, automatically! From automatic defrost, to the separate freezer compartment, to door shelves, to the trip-saver handle, this new Servel has every deluxe feature your customers ever wanted *plus* the refrigeration miracle of ice "cubes" without trays—automatically!

SERVEL AD DRIVE STARTS THIS MONTH!

Get complete information on how you can cash in on this great advertising and promotional drive with TV, radio, newspapers and billboards in your own local area!

SEE YOUR SERVEL DISTRIBUTOR TODAY!

A complete line of fully automatic gas water heaters in a range of sizes to fit every need! Servel—the most dependable, trouble-free automatic water heater on the market!



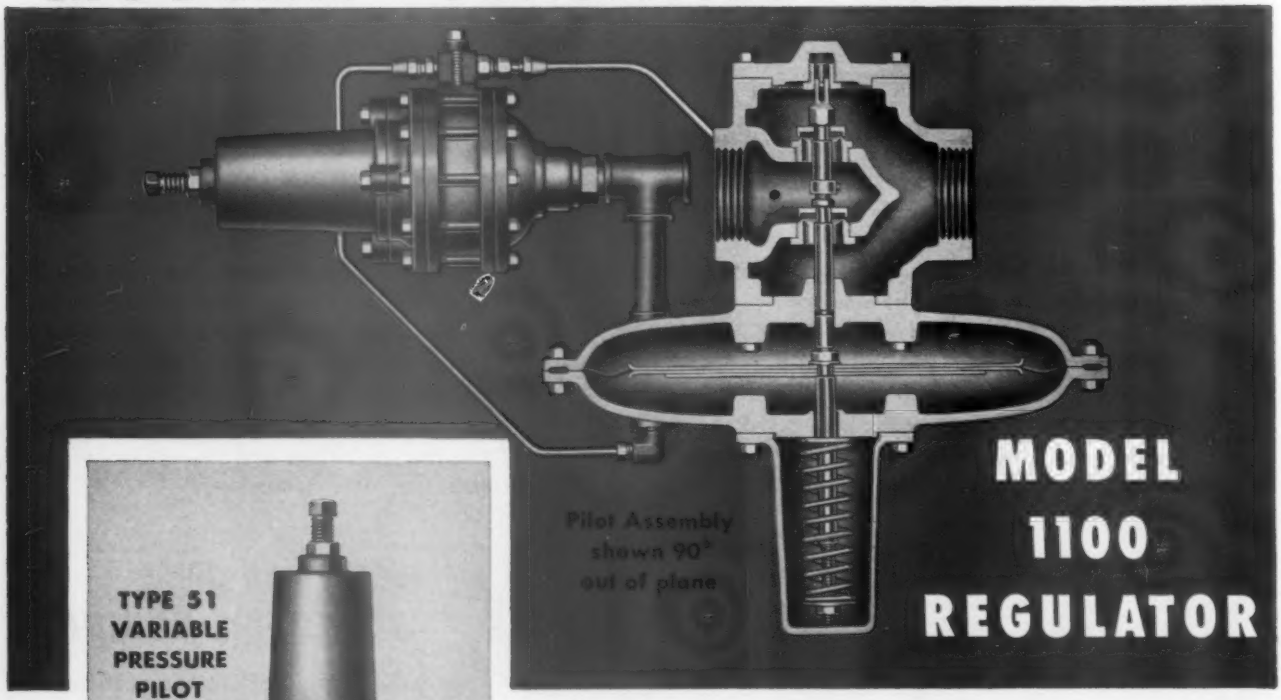
The name to watch for great advances in **REFRIGERATION** and **AIR CONDITIONING**

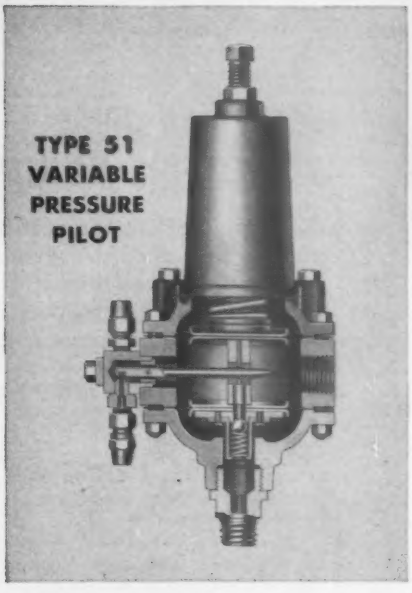
Servel

Servel Inc., Dept. AG8, Evansville 20, Indiana

Chaplin-Fulton

MODERN—VERSATILE—ACCURATE





• the heart of the MODEL 1100 assembly, insuring precisely accurate control over the complete flow range. • Unitized construction—valve lever and orifice as a unit are removed from the outside, without disturbing balance of assembly. The likely trouble spot—the orifice—is placed outside where you can get at it quickly—no internal tubes to clog. • Twin diaphragms remove as a unit. • Internal relief unit—guards against overpressure. • Spring unit—remove three screws to change springs. • Built for service. • Used for accuracy.

You can't buy, beg, borrow or steal a more versatile pressure regulator than MODEL 1100. Nor has traditional Chaplin-Fulton ruggedness, simplicity or accuracy been forgotten in this new modern design. Size—2" only.

Wider Application —Inlet Max.—250 psi. Outlet Range—1" to 75 psi or 50 to 150 psi.

Greater Capacity —24,000 CFH at 10 psi to ounces; 114,000 at 100 psi. Body contoured for flow.

Easier Maintenance—regulator or pilot can be serviced without disturbing the other. Quickly accessible orifices in both, easily renewable.

Simpler Installation—only one connection required. No complicated pins or toggles to adjust.

You can standardize on MODEL 1100 for a wider range of your industrial, commercial or distribution installations.

ACCURATE CF MFG CO DEPENDABLE

Chaplin-Fulton
MANUFACTURING COMPANY
Pittsburgh 25, Pennsylvania

Editorial:

Wanted—New Policies and Practices

RELIABLE gas service to industry, most particularly for processing applications that require the combined superior advantages offered only by gas in advanced gas equipment, has been the protracted subject of controversy in and out of the gas industry—and it has not yet been resolved.

The position of industrial gas in the overall economics of the gas industry should be evident to almost everyone bright enough to read simplified statistics—especially when they are in bold type, as they are on page 19.

Smaller percentage increase in number of customers than residential . . . larger, but not much, percentage increase in delivered gas volume than residential . . . more than double the percentage increase in dollar revenues.

That's the picture from 1938 to 1953. But, the statistics on page 19 include only the customers, gas volume and revenues of the utilities. Add the dollars in direct pipeline sales to industrial customers—but hold on to that toupee—and see how the numbers change.

Much has been done in and for the overall American industrial economy by gas and gas utilization equipment, but there is still the scornful pointing and growling of "Unclean!" Unclean, it's interruptible!

We're well aware that there are many large industrial customers who get gas continuously for higher processing purposes, but where are they? Near the big production areas, where they have first call before natural gas starts through the long pipelines to distant markets. We're well aware, too, that curtailments and interruptions have been less severe in the cold North during the past 2 or 3 Winters, but why? The weather has been less severe. But, we haven't heard of any weather guarantees, lately, so the threat is still there.

Can New England gas companies offer their large industrials dependable gas service, 12 months of the year, for the highly-essential work that is being produced there? Will the Northwest gas companies be able to offer it?

As long as that threat remains, gas will lose more and more of the prospects for the higher processing installations—where gas will produce superior results. As long as that threat remains, the gas industry really is imposing a handicap on the rest of the industrial economy. It is not making it possible to apply available technological advances that should be applied in the national interest. It is not possible to apply those advances because the prospective customers cannot build interruptibility into their production plans. They cannot afford to gamble that they will have gas whenever they need it and in the volumes that they will need.

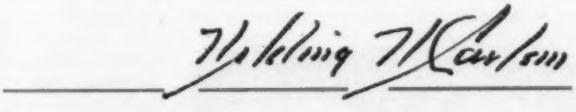
Managements of industrials, just as the managements of gas companies, cannot gamble on whether they will be able to produce and on their costs.

The leading proponent of uninterrupted sales of gas to industry at rates that are at least fully-commensurate with the premium quality of the fuel, Frederic O. Hess, has dramatized the ever-advancing technological accomplishments and potentials of gas—to the industry itself and to consuming industries. He has called upon American Gas Association's board of directors, in his capacity as a member, to bring about a capable and sound study of every consideration involved in selling gas to industry.

The industrial gas problem . . . and it, too, is a problem . . . implies much more than appointing just another association committee to study-and-report. The gas industry's ranking executive authorities on industrial gas distribution and utilization would be most advantageously supplemented in such a study by the active participation of process engineer-executives from the major consuming industries. Thereby, the full view should be brought to light, from inside the gas industry and inside the consuming industries.

Out of a deep-seated conviction on the essentiality of dependable gas supply to meet the tightening-technologies of industrial processing, we can only hope that a thoroughgoing study will be launched and in a seek-all-tell-all atmosphere. That study could and should become the basis for a realistic reappraisal of industry attitudes, for the establishment of appropriate policies and practices to be followed in the future . . . and it's the future that has tremendous importance.

There is not, indeed, any lack of conviction that the problem of dependable industrial gas service for the higher processing purposes, at premium rates, cannot be solved by the gas industry, especially if that problem is viewed and weighed by men at the industry's highest levels together with their consumer-counterparts.



Where to Place the Reference Electrode on a Pipeline

by **Leon P. Sudrabin** *and* **Joseph A. Lehmann**

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Electro Rust-Proofing Corporation

Leon P. Sudrabin

Joseph A. Lehmann

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ALMOST perplexing problem often met by the corrosion engineer is the location of the reference electrode to establish the effectiveness of cathodic protection. This problem is emphasized by instances where leaks develop on a pipeline even though a pipe-to-Cu-$CuSO_4$ reference electrode potential more electro-negative than —.85 volts has been measured or conversely if it is evident that the line is adequately protected at lower electro-negative potentials.

On a cathodically-protected bare line, the potential "seen" by the reference electrode usually varies with the position of the electrode relative to the pipeline. It is the intent of this presentation to develop a concept useful for determining the relation of the reference electrode location and the control of local and/or long-line corrosion currents.

Among the useful basic values is the potential of iron in airfree soil (pH 2.9 to 9.6 and resistivity 60 to 17,800 ohm-cm.), established by Schwerdtfeger and McDorman[3] to be —.85 volts measured against a Cu-$CuSO_4$ reference electrode. This is normally the open circuit potential of an iron anode.

Brown and Mears[2] define cathodic protection as being complete when the cathodes are polarized to the open circuit potential of the anode E'_a. Such cathode polarization[1] includes (a) the counter-emf byproducts formed or by concentration changes resulting from passage of current through an electrolytic cell, (b) the IR drop effects between the cathode and the electrical boundary of the protected corrosion cell expressed in terms of an emf, and (c) the activation potential required to drive an appreciable current through the interface where the electrode reactions may be inherently slow.

The protective potential (E'_a) and the polarized cathode potential may be expressed by the general equation:

$$E'_a = E_c + I_p (R_{cf} + R_{kc}P)$$

where E_c = cathode potential (closed circuit—including polarization effects a. and c.)
I_p = protective current
R_{cf} = resistance (cathode film)
$R_{kc}P$ = resistance (soil contiguous with the cathode)

It has been shown, in localized pitting, that the IR drop effect through the cathode component must be included in the cathodic polarization and that this form of polarization becomes increasingly important as the resistivity increases.[4] This form of polarization is characteristic for each corroding cell and is determined by its spatial conformation. For a pit (anode) ½" in diameter the reference electrode should be placed nearly ½" away from the adjoining bare cathodic surfaces at the electrical boundary of the protected corrosion cell to include all the polarization effect the system is entitled to. A potential of —.85 volts measured to Cu-$CuSO_4$ reference electrode placed closer to the metal would result in over-protection since all the IR drop effect involved in the cathode polarization is not included. A reference electrode location outside this boundary will include an IR drop through the soil which has no effect on controlling the corrosion current and will result in only partial prevention of the localized activity. The latter situation may account for some reports that a pipe must be polarized to a potential more electro-negative than —.85 volts to attain protection.

When the corrosion system anodic and cathodic areas increase in size or are spaced farther apart, the electrical boundary of the protected corrosion system tends to move away from the pipeline and a more remote reference electrode location may be used.

The preceding discussion implies that stopping long-line galvanic corrosion requires the use of a remote reference electrode position (100'+). Such control may only reduce the localized pitting action on bare pipelines (this pitting is more prevalent than commonly recognized, even in some very high resistivity soils). This pitting can occur anywhere on the bare unprotected pipe surface and it can be particularly intense on areas otherwise generally cathodic.

Subsurface potential calculation

To calculate the pipe potential to some desired location over the pipe center axis, when the potential at the ground surface is known, the following formula may be helpful. It should be recognized that the accuracy with which this equation may be used is limited by the reliability and significance of the date used.

$$E_s = E_2 - .012\ PI\ \left(\log\frac{d}{r} - \log\frac{2d\text{-}r}{d}\right)$$

where E_s = Potential at radius r over pipe
E_2 = Potential measured at ground surface
P = Soil resistivity
d = Depth of pipe burial in feet
r = Radius from center axis of pipe where E_r is to be determined in feet
I = ma of protective current per lineal foot of pipe

The use of a good high resistance coating greatly lessens the importance of the reference electrode location. Since nearly all the IR drop form of cathodic polarization occurs across this resistive coating, the potential observed is comparatively independent of the reference electrode location. Low resistivity soils also allow some wider latitude in the location of a reference electrode position to make significant observations. The IR drop form of cathodic polarization through the conductive soil component of the protected corrosion system may only be a small part of the total polarization. In any instance, the raising of the earth potential by the protective anode system or the shielding and/or foreign effects of neighboring structures must also be considered.

Thought must also be given to the "null methods" of potential measurement. Since they either exclude all the IR drop form of polarization, or only include the R_{cf} effect, one of their values in high resistivity soils is to identify a change in the cathode area

American Gas Journal FEATURE

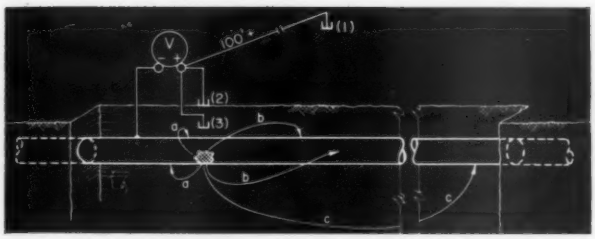


Figure 1

CATHODIC PROTECTION OF BARE PIPE

Protective current from remote ground bed

V—Potentiometer
(1)—Remote Cu•CuSO$_4$ electrode
(2)—Surface (over pipe) Cu•CuSO$_4$ electrode
(3)—Near pipe surface Cu•CuSO$_4$ electrode
a—Local cell current
b—Intermediate galvanic current
c—Long line galvanic current

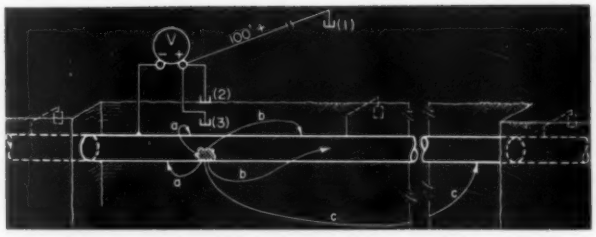


Figure 2

CATHODIC PROTECTION OF BARE PIPE

Protective current from distributed magnesium anodes

V—Potentiometer
(1)—Remote Cu•CuSO$_4$ electrode
(2)—Surface (over pipe) Cu•CuSO$_4$ electrode
(3)—Near pipe surface Cu•CuSO$_4$ electrode
a—Local cell current
b—Intermediate galvanic current
c—Long line galvanic current

electrode reaction. It has been observed in some very high resistivity environments that protection can be attained through IR drop potential effects alone with no discernible cathodic reaction change.

The use of earth current measurement methods also have some evident limitations, particularly where the attack is of a pitting or localized nature.

Examples

To illustrate the concept just presented, we shall use 3 examples which intentionally exclude outside effects, such as shielding and interference from foreign structures. When the latter effects do occur they must be considered by the corrosion engineer.

CASE A—A section of bare pipeline, insulated at each end and receiving protective current from a remote anode bed (the pipe line is outside the easily-discernable protective anode potential gradient).

The relation of the Cu-CuSO$_4$ reference electrode location and the control of corrosion currents on a bare pipeline, protected from a remote ground bed, are illustrated by Figure 1.

1. The corrosion effect of long line current "c" is controlled when —.85 volts is measured at location "1". The effects of corrosion current "a" and "b" are lessened.
2. The effects of corrosion currents "b" and "c" are controlled when —.85 volts is measured at location "2". The effects of corrosion current "a" are lessened.
3. The effects of corrosion currents "a", "b" and "c" are controlled when —.85 volts is measured at location "3" near the pipe surface.

CASE B—A section of bare pipeline, insulated at each end and receiving protective current from distributed anodes.

Similar to Case A, an interpretation of reference electrode location and corrosion current control can be made on a bare pipeline protected by distributed galvanic (magnesium, zinc) anodes. See Figure 2.

In Case A and Case B, where the pipeline is *not* insulated at each end, and shielding effects exist, the reference electrode locations "2" and "3" only should be used and interpreted as described in 2 and 3, above.

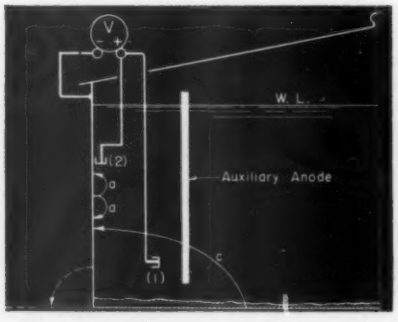
CASE C—An uncoated water standpipe protected from vertically hung anodes.

A water standpipe, in Figure 3, can be used to support some of the views previously discussed. Suspended matter which settles on the floor, creates a large oxygen concentration cell between the floor and the side walls directly in contact with aerated water. This cell results in the long line corrosion current flow "c." In spite of some protective effect on the sidewalls by this

Figure 3

CATHODIC PROTECTION OF BARE STANDPIPE

Protective current from vertically hung anodes



V—Potentiometer
(1)—Semi-remote reference electrode
(2)—Near metal surface reference electrode
a—Local cell current
c—Long line galvanic current

corrosion current flow, severe localized pitting usually occurs as suggested in local cell corrosion current "a."

Potentials measured to a Cu-CuSO$_4$ reference electrode placed near the floor of an unprotected tank in a high-resistivity, well-aerated water are in the neighborhood of —.600 volts. The average potential on the side wall may be —.300 volts. Pits and vertically etched streaks are observed developing randomly over the otherwise-cathodic vertical surface.

The potential profile of the vertical wall of the tank measured at 6″ intervals to a reference electrode lowered at a distance of 12″ from the wall, will often be outside the electrical boundary of the corroding local cells "a." The discrete anode areas are not identified until the potentials are observed closer to the tank surface.

A potential of —.85 volts measured against a reference electrode placed (Location "1") in the bulk of water will indicate control of the harmful effects from corrosion current "c."

In order to control local cell corrosion current "a," a potential of —.85 volts must be observed to a reference electrode placed within ½″ of the sidewall. Much more protective current is required to fully control corrosion current "a" than to control corrosion current "c."

Although plane areas are dealt with in the tank, it is of interest to compare Case A, Figure 1, with Case C, Figure 3, when the sidewall of the tank is rotated counterclockwise 90°.

Discussion

The preceding illustrations emphasize the importance of spatial factors and the IR drop form of cathodic polarization in the cathodic protection of a bare pipeline. All polarization changes resulting from the ampere-hour protective current effects are included in the potential measurements shown.

Since the length of bare pipe most affecting the potential "seen" by the reference electrode is equal to about 2 times the distance of the reference electrode from the pipeline, frequently spaced potential measurements are indicated for localized pitting control. The experience and competence of the engineer must be called upon to establish the practical and most productive procedure and frequency of measurement to assure localized pitting control on a specific pipeline.

Burial of bare pipe in a high resistivity soil does not give assurance that intense pitting will not occur. Pipeline operators who cannot tolerate either general or incidental pipe wall penetration are well advised to apply a good coating system to a new line, police it with cathodic protection or use appropriate stray current measures where required. The protective requirements to control local action corrosion cur-

Turn to page 35—ELECTRODE

Economical Capacity Increases for Low Pressure Systems

by **L. C. Rohret**
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DURING the growth period of manufactured gas systems, it was almost axiomatic that areas with heaviest loads were the areas of densest population, and lighter loads were around the outskirts. With the advent of natural gas, however, the situation was reversed. Areas in the outskirts, with large increases in dwelling units, and with high space heating and water heating saturations, are now areas of heavy loads.

L. C. Rohret

Loads in older areas, closer to the plants, with less room for expansion, ordinarily do not increase as rapidly, and the large mains in these sections often provide adequate service. The parts of a city that are outside the large-main area must then rely upon feeders and belt lines which were designed to handle loads on the basis of manufactured gas usages and consumptions. Although the effective capacities of these lines are nearly doubled with the distribution of 1,000 Btu natural gas, this is not enough, as a 10-fold-or-more increase in the volume of gas used is not uncommon. The maximum demand to be carried by the system will be many times that of manufactured gas, with even a moderate saturation of space heating.

Service requirements become more exacting. The old rule-of-thumb which permitted a 50% fluctuation above or below the set pressure must be abandoned. Natural gas, having a much slower flame propagation, necessitates a more uniform regulation; modern automatic appliances will not function properly with wide pressure fluctuations.

Large peak loads suddenly placed upon gas distribution systems designed for moderate manufactured gas loads, have created a major problem for gas companies that have converted or are about to convert to natural gas. Company policy and engineering considerations have been directed to provide adequate handling of large peak loads; long-range programs have been adopted to permit a continued rapid growth. Utilities must study those problems and seek solutions which will best meet individual requirements.

It is necessary to stop thinking in terms of manufactured gas—to think in terms of natural gas. Conventional methods used to improve service in manufactured gas systems very often prove to be only stop-gaps in natural gas service. It will be wise to recognize the newer conditions and problems, and then grasp the opportunity for planning an integrated system which permits continued expansion.

One of our clients, converting to natural gas, believed that with the addition of a few feeder lines and district regulators feeding the low pressure distribution system, they could handle the load.

The load growth was so rapid in the larger cities of the group, that the augmented low pressure systems soon became incapable of handling the load demands on maximum days. A study of their conditions indicated a relatively large investment would be necessary to handle their connected load satisfactorily if they continued adding more laterals and regulators to their feeder system.

The decision was to convert the low pressure distribution systems to a regulated low pressure system, as this plan involved the lowest capital investment, provided for the greatest load expansion, held the unaccounted-for gas at a minimum, permitted 100% utilization of existing facilities, and required only a normal maintenance program.

Regulated low pressure

Regulated low pressure is probably a new idea to many men in the gas industry but its application is not new. In 1927, while the author was gas engineer for a group of Southern properties, a small installation of this type on a manufactured gas system, improved service and enabled the system to carry extremely high peak loads with a comparatively nominal investment. The system has operated perfectly during the intervening years without a single failure. The original regulators are still in service with the original diaphragms, even after conversion to natural gas. With the extension of the system, the company has adopted governors with spring-type reliefs.

Regulated low pressure will solve many problems besetting the utility company, but the installation should not be made without careful study of all factors. The usual pitfalls always accompany ill-conceived or poorly-executed plans.

Simply stated, regulated low pressure consists of a house regulator on every service with no change in the present existing operating pressure except to meet peak conditions.

For example, normal pressure carried by a system might be 8″ w.c., and it might be decided to set the regulators at 6″ w.c. with all appliances adjusted to that pressure. This would assure uniform pressure and service at all times.

It may be considered desirable to continue operating at 8″ w.c. The regulators would then be set at that pressure, remaining wide open under normal conditions, and would operate only when the system pressures exceeded 8″. This plan was used on the Southern installation mentioned earlier. While no troubles developed, it is the author's opinion that the first plan—regulators at 6″—is better because the regulators are working all the time. This is a measure of assurance of their correct operation, and with a 2″ pressure margin between the normal main and set house regulator pressures, a 2″ drop in the main pressure may occur without affecting the pressure at the appliances.

City A

At the time of conversion to natural gas, City A had the conventional low pressure main system. When natural gas was introduced, a number of high pressure feeders were installed which fed into the low pressure system, at selected points, through district regulators. Main extensions into new areas and new developments were made high pressure, so no difficulties were experienced in the high pressure areas. The low pressure system was a network of cast iron and steel mains, in the usual pattern of large mains, leading from the old manufacturing plant, which were successively reduced in size until the edges of the city were served with relatively small mains.

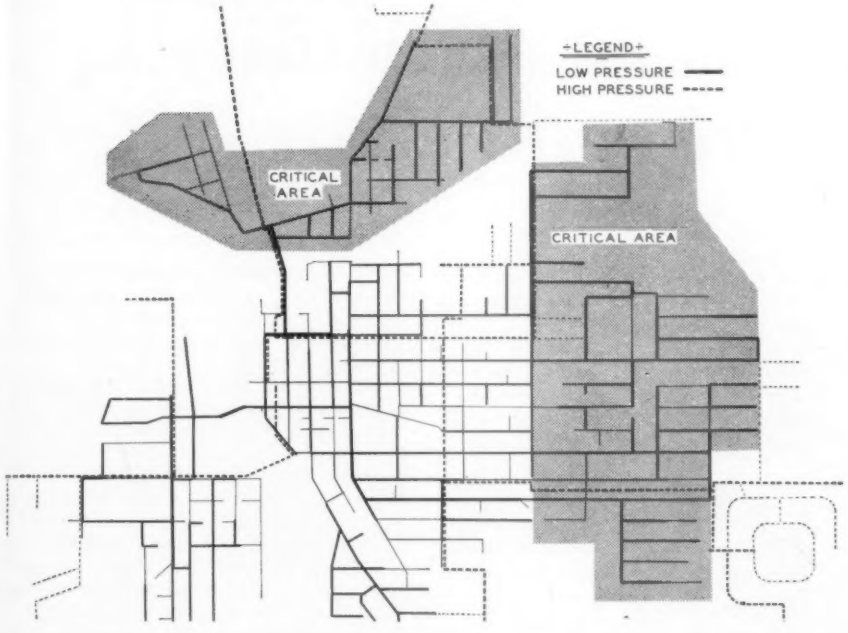
Even though the low pressure mains and services were old, unaccounted-for gas was normal while manufactured gas was being distributed, but increased rapidly with natural gas. Many leaks which were plugged off with tar and dirt deposits opened when natural gas absorbed the tars. The maintenance program was increased to hold unaccounted-for gas within limits.

As pointed out earlier, the company felt that extending feeders and adding district regulators to feed the low pressure system would be sufficient.

The capacity of the low pressure system, generous under manufactured gas, was sufficient to carry the increasing natural gas load only for the first year, by the expedient of installing additional district regulators, replacing old mains with larger mains and by making a number of interconnections. Although a supply of gas was maintained, the pressure conditions were bad. With continuing increase in load, it became more and more evident that these measures would no longer suffice. It became necessary to plan an integrated long-range program.

A study was then undertaken by the author to develop a broad program that could be adhered to for a number of years. Various plans were analyzed; most of them

Partial Map of City A Showing Critical Areas



were found to be undesirable because of objectionable operating features or prohibitive costs.

The alternatives were finally reduced to the choice of (a) conversion immediately to intermediate pressure, or (b) conversion to regulated low pressure operation. Conversion of the system to intermediate pressure was not deemed advisable; an excessive unaccounted-for could be expected with the attendant dangers of high gas leakage until the system could be completely worked over and tightened.

It was decided to place the system on regulated low pressure, with a relatively low investment per customer, and no objectionable features in other plans.

The system could be readily sectionalized into 3 parts. A study of the load conditions in each section indicated the need for immediate action in 2 sections. The larger mains in the third section in the older part of the city would be adequate to carry the load through the 1952-53 heating season, without excessive pressure fluctuations. This area contained about half the customers.

The conversion was made in 2 steps; the first included the 2 critical areas, the second step would be the remainder of the system to be converted at a later date. In the two critical areas mains and services known to be in poor condition were replaced or repaired. Some additional high pressure feeder mains, a number of new district regulators and valves separating the 3 sections were installed. It was necessary to isolate the 2 critical areas until the third section is completed, at which time the valves will be opened and the entire low pressure system will again be operated as a single unit.

Installation of the regulators was very simple and caused no service interruptions or inconvenience to the customers. In almost every instance, it was possible to do the work immediately.

As quickly as a regulator was installed, the gas company serviceman assigned to the conversion contractor's crew would light pilots, adjust appliances and report to the householder that everything was in order.

The regulator selected for this service was 1″ with a ½″ orifice. This regulator with an inlet pressure of 8″ and set for 7″ at the outlet, will pass about 200 cfh, with 6″ final pressure at the outlet; 360 cfh, with 5.5″ final pressure. The particular regulator design selected permits replacing the ½″ orifice with a smaller orifice when increased pressures will require closer regulation. The regulators have relief valves.

Operation

In operation, the pressure is maintained at 8″ at the district regulators, which is sufficient to carry the load for all but peak days. As this is normal pressure, there is no increase in the unaccounted-for gas. However, on peak days it will be necessary to increase the pressure a few inches at the district governors, to maintain the required 8″ minimum throughout the system. The increase in unaccounted-for during these few days is negligible; the pressure increase is for relatively short times.

It will be necessary to increase the pressure as the load grows, but this increase will be but a few inches each year. With the proper setting of district regulators, there will be only the pressure necessary to maintain the desired 8″ minimum. A normal maintenance program will keep unaccounted-for gas at a reasonable figure.

The results in City A have been extremely satisfactory. There has been a great improvement in service with the number of service calls reduced to a minimum. Pressure complaints and the dangers of wide fluctuations have been eliminated in the areas now served by regulated low pressure. The customers are very well satisfied, public relations have been much improved.

The cost of converting to regulated low pressure has averaged about $20.00 per customer to date, but with rising costs it is expected that the cost of the remaining installations will average a little higher. These costs are very reasonable when one considers that the capacity of the existing distribution system has been increased far beyond the requirements of the foreseeable future, without the necessity of tearing up the streets to lay larger mains. It is expected that in the course of the maintenance program, old badly leaking mains will be replaced with mains of greater capacity.

With a properly-installed overriding regulator to protect the distribution system from overpressure due to the failure of a district regulator, regulated low pressure provides a safe system from the operational standpoint.

The house regulators act as a secondary line of defense, confining any possible overpressure to the distribution system, where it should do no harm. House regulators equipped with safety reliefs provide the additional safety feature by venting excess gas. With comparatively small volumes of gas at any one point, heavy concentrations are avoided.

City B

In City B, the situation was somewhat different. This system had been supplied with manufactured gas through a 4″ pipeline, 14 miles long. Pressure was reduced through district regulators and distributed at low pressure.

With the introduction of natural gas, the load grew rapidly. Within a year the city had completely outgrown the distribution system and the belt line feeding it. 14 miles of 6″ high pressure line parallel the 4″ line between City A and City B, and additional feeder lines were laid within City B.

A study of the City B distribution system disclosed a critical pressure situation over the entire city, and that its conversion to regulated low pressure must be accomplished immediately.

The work of installing the regulators in City B was started a little later than in City A, and the work extended into the first part of the heating season. The method of doing the work was very much like the procedure used in City A. Customers suffered a minimum of inconvenience.

The cost of installing regulators in City B was a little higher than in City A, but the total cost was far below any other plan to give a comparable increase in capacity and to hold operating and maintenance costs at a normal level.

Comments

It must not be presumed that in order to utilize the advantages of regulated low pressure, the entire system must be converted. Its advantages may be utilized in local areas where the pressure conditions are critical or where the distribution system is inadequate. Its use is not confined to natural gas nor to rapidly growing systems. Any company operating low pressure distribution systems might well investigate its possibilities to increase effective capacity at moderate cost, bettering pressure conditions, improving service, holding unaccounted-for at a minimum and reducing hazards of accidental overpressuring.

Experience during the past heating season demonstrated the practicability of regulated low pressure—performance exceeded expectations in every way.

How to Balance the Utility's Annual Load Factor

by **Paul E. Peacock, Jr.**
President
Peacock Corporation
Westfield, New Jersey

THE interruptible industrial gas rate offers many advantages to the natural gas utility faced with the dilemma of heavily-loaded lines in Winter and an almost 50% reduction of that load during much of the rest of the year. The utility using such a gas rate assumes the responsibility of, first, informing the industrial customer of his responsibility under such a rate and then seeing that this customer assumes that responsibility. Improper understanding of this responsibility has in some cases resulted in embarrassment to the utility and financial loss to the industrial customer when natural gas had to be curtailed and a suitable standby service had not been installed and maintained.

In the past, many gas utilities have offered industrial users the choice of a firm-rate service or an interruptible-rate service. The trend today seems to be toward placing all large industrial consumers on the interruptible rate. Where adequate interruptible rates are used, these rates in themselves tend to eliminate the forceful use of the interruptible rate and gives the industrial customer a feeling that they are not having the interruptible rate "crammed down their throat." The optional rates, therefore, have a decided advantage to the utility from a public relations standpoint.

The unbalanced load factor caused by the heating gas load was discussed in an earlier article by this author [AMERICAN GAS JOURNAL, January 1954], and gave an example of cost of various types of gas service in a typical New England area. While this article will not cover in complete detail the material in that earlier article, a review of some pertinent data is in order.

Following World War II, operating under an unrestricted price market, the prices of most heating fuels spiraled upwards. At the same time, the cost of gas was controlled and regulated to such an extent that an unprecedented demand for gas heating resulted in large backlogs of orders for heating installations. Coupled with this already-unbalanced condition was the feeling of some utility managements that if the heating rate was low enough to get the heating load, this in itself would guarantee the cooking, water heating and refrigeration load of that customer.

That condition was in effect when large areas received natural gas and in many cases the cost of the gas for heating was further reduced and this caused a still greater overloading of systems on cold Winter days and resulted in a greatly unbalanced load factor. This unbalanced load factor was such that it was not possible for the pipeline companies to operate economically or efficiently; they were forced to place some restriction or penalty upon utilities that took unlimited gas during the heavy heating season.

One of the early restrictions was to charge a very high price for all gas above a specified maximum volume taken by the utility on peak days. In at least one case this charge was at the rate of $10.00 per Mcf for all gas received above the maximum volume of the contract. This made each million cubic feet, above the maximum, cost the utility $10,000 and, when this gas was being sold to industrial as well as domestic customers on a firm rate—something had to be done. It is obvious that the larger industrial customers would have to be curtailed on those days when the gas being received by the utility exceeded the maximum covered by the contract with the pipeline company.

Although the use of heavy penalties for gas taken in excess of the contract helped the situation in some ways, it still did not meet the needs of the majority of the pipeline companies. The next step was to the demand-commodity rate used in so many areas today. These rates vary somewhat over the country, but in the New England area one pipeline at least has a demand-commodity rate of $4.50 per Mcf for the demand and 30¢ per Mcf commodity.

Using the million cubic feet on the peak day of the year as before, the peak day would establish the "demand" rate for the next 12 months. Thus, this one million cubic feet would actually cost the utility 1,000 Mcf x $4.50 x 12 months, or $54,000.00 during the next 12 months. Add to this the commodity charge of 30¢ per Mcf and the total cost of the top one million cubic feet of gas on the peak day of the year would amount to $54,300.00.

With this condition, the utility faced the dual problem of, first, being able to hold the existing industrial loads at rates which would allow the delivery of gas at all times and, second, adding industrial loads that would even out the gas loads during the rest of the year when peak heating loads were not encountered. The use of adequate interruptible industrial gas rates would solve the second phase of this problem and would allow a choice of rates to industries large enough to afford installation of a standby gas service.

Advantages to the utility

By use of a peak shaving gas, the utility could shave down part of the demand on peak days but the cost of most peak shave gas prohibits unlimited shaving. The utility and the pipeline company still had the very unbalanced load factors between Winter and Summer. This condition could be corrected by the adding of seasonal gas loads, or interruptible industrial gas. The latter solution is the more logical in most areas and opens new wide fields of industrial gas sales.

Since the "demand" has already been established on the maximum peak day of the previous Winter, any gas sold during the rest of the year would be at the commodity rate of 30¢ per Mcf or 3¢ per therm. The utility has overhead and most operating costs already charged against the firm gas and this is as it should be. It remains then that the utility *could* sell interruptible gas at a nominal profit above the 3¢ per therm and greatly increase the annual gas sales.

Turn to page 36—LOAD FACTOR

INDUSTRIAL GAS CUSTOMERS' requirements for service vary widely, from "essential" to "cheap fuel." Accordingly, the sales potential varies from the point where the cost of gas is not a factor to the point where it is the sole and sharp factor. Paul E. Peacock, Jr. considers the viewpoints of the utilities and the customers in this extension of his discussion in our January issue. Mr. Peacock, a nationally-recognized authority on LP gas engineering and operation, has designed approximately 100 peak load and standby plants for gas utilities and industrial gas consumers.

Paul E. Peacock, Jr.

Influence of Gas on Industry Stressed at World Conference

PRODUCTION of glass fibers, a growing industry with widening product-applications, is fundamentally a function of gas operating distinctly as a source of heat, a forming tool and as a product conveyor. Each of the operations is under independent control, influencing the size, properties and shapes of the fibers in accordance with the requirements for hundreds of uses. The conversion of glass into microscopic fibers is achieved by high-temperature and high-velocity gas streams dispersing the fibers at *supersonic speeds*.

Frederic O. Hess

The essential character of gas in the glass industry was emphasized by Frederic O. Hess, president, Selas Corporation of America, in the course of his presentation to the World Power Conference in Rio de Janeiro, late last month.

"The television industry is at present inconceivable without gaseous fuel for the television tube, this marvel of precision glass manufacture.

"Never before," Mr. Hess stated, "was the glass industry called upon to produce millions of pieces of such complexity, size and weight and with such accuracy—and gaseous fuel contributes in many ways to the successful accomplishment."

Tin cans would hardly be the universal package for food and thousands of other products without gaseous fuel, he said in his comments delivered for him to the conference in behalf of the United States National Committee.

The modern tin can industry, dealing in hundreds of millions of containers per year, is based on low unit cost and high automatic production with extreme precision and reliability to protect the contents of the tin can for the consumer.

"No other heating medium and manufacturing process has been developed to substitute economically for gaseous fuel in can manufacture at modern speeds of ten cans per second," Mr. Hess emphasized. "The deceptive simplicity of the tin can is based on precision and control of essential heating operations."

The position of gas in industry was exemplified for the delegates to the conference, from most countries of the World, by the experiences of American industry using gas for every conceivable type of product processing.

"This basic fact that heat is so universally required during industrial production," Mr. Hess said, "coupled with the essentiality of exacting control explains the growth as well as the importance and influence of gaseous fuel. Statistically, it could be readily shown by examples from various countries how gaseous fuel consumption increased with advancing industrial development."

Natural gas was shown to have supplied 11.8% of the total U.S. energy in 1938 and in 1952, with an overall increase of 80% in energy requirements over 1938, natural gas supplied 22.5% of the most recent total. The only other advance was for petroleum, from 34.5% to 39.4% in the 14-year period. Bituminous, anthracite and water power showed declines in their percentages of energy supplied.

A sales comparison by Mr. Hess stressed

Turn to page 38—WORLD CONFERENCE

COMPARISON OF INDUSTRIAL AND RESIDENTIAL GAS

Based on data compiled by American Gas Association

UTILITY CUSTOMERS
(in thousands)

	1953	1938
Industrial	106.5	75.0
Increase—42%		
Residential	24,649.9	15,697.0
Increase—56.6%		

UTILITY SALES
(in millions of therms)

	1953	1938
Industrial	30,389.5	7,940.9
Increase—284%		
Residential	18,037.4	4,956.2
Increase—265%		

UTILITY REVENUES
(in millions of dollars)

	1953	1938
Industrial	739.4	144.9
Increase—410%		
Residential	1,574.7	522.6
Increase—201%		

Review responsibility to industrial economy—Hess asked AGA board

THE ADVANCED TECHNOLOGIES of using gas in industry for processing purposes were stressed by Frederic O. Hess, as a member of the board of directors of American Gas Association, in an appeal for a reappraisal of the approach to industrial gas during a board meeting earlier this year. The statement made by Mr. Hess is quoted in its entirety.

"All of you have heard of automation, and have read some more or less fantastic newspaper and magazine articles about the automatic factory of the future. But just as true as the main features of your gas appliances are automatic range, automatic waterheater, automatic house heating—so is the emphasis in industry on automatic operation—by necessity rather than by reasons of comfort or convenience. This fact can be proven by the record that before World War II automatic control instruments represented 1-to-3% of total capital expenditures for machinery and equipment in industrial plants, and during the last few years this figure has risen to about 7-to-8% —and the rise is continuing.

"I . . . wish to establish the trend as a fact—the trend towards automation, which is progressing, not because of merchandising but our technology demands it, and makes it possible. Our future as a nation poses a technological rather than a sales and merchandising approach.

"Now, automation goes deeper than mere automatic control instruments—it calls for re-thinking of our products or processes, for system engineering rather than single steps, such as fitting one or two automatic machines into the production cycle.

"That is why gas has a stake—why gas is on trial—why the future of industrial gas is being determined. And that is taking place *now*. Let me illustrate by actual cases:

"In the metal fabricating industry a sample production plant for a much needed metal product is now being built. The purpose is to develop a highly mechanized modern factory, along the concept of automation, as a 'standard'—to be duplicated at various locations in the U.S. about a dozen times.

"Production includes about 7 heating and heat-treatment operations of 42 tons of steel per hour requiring, in the 12 projected plants, approximately 10 billion cu. ft. of natural gas per year. At 50¢ per Mcf, that represents 5 million dollars gas revenue—or proportionately more for a justifiable higher gas rate. *But*—the model plant is being built for electric induction heating and heat-treatment because of unreliable gas supply.

"The steel industry has many automatic operations, but is far from automatic; steelmaking is not automatic. However, rethinking of the entire process is taking place. It starts with melting and casting, and the continuous casting process is on the way—with electric furnaces—not fuel-fired open hearth. The electric industry openly and ac-

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AMERICAN Gas Journal FEATURE

How Interstate Laws Affect Gas Company Operations

by Leo T. Parker
Attorney at Law
Cincinnati

IS it proper for a court in the states in which a gas company transacts business to render a decision in an ordinary law suit, or should the suit be decided by a court in the state in which the company was organized? And, what is the law as to sales contracts for merchandise shipped from one state to a buyer in another state?"

These questions involving the legal rights and duties of foreign gas companies, and particularly the proper jurisdiction of law suits, were raised recently and are certainly worthy of consideration.

First, it is important to know that if the internal affairs of the company are involved in suits of this nature, while the state in which the company was organized has authority to control and regulate these internal affairs, the state in which the foreign company transacted business has jurisdiction to decide other kinds of suits.

In Sharp v. Jim, 39 Cal. App. (2d) 435, a suit was filed to enjoin the levy of an assessment on the corporate stock of an Arizona company in which all parties, property, business offices and records were in California. It was held that the California court had jurisdiction.

In Consumers', 280 Pa. 263, it was shown that a Delaware company had its business office in Pennsylvania. A suit for receivership, because of corporate mismanagement, was held proper in Pennsylvania.

In Corry v. Barre Company, 9 Vt. 413, a stockholder attacked the wrongful conduct of corporation officers in attempted disposal of the corporate assets. The corporation was chartered in Maine expressly for the purpose of doing business in Vermont, where its property was situated. The court held the corporation entitled to the relief in Vermont "even if it involves an interference with the internal affairs of the corporation."

In Mayer, 110 N. J. Eq. 141, a Delaware corporation had its principal business in New Jersey. Accounting and restitution of misappropriated property by the corporation was properly ordered by the New Jersey court.

In Williamson v. Missouri-Kansas Pipe Line Company, 7 Cir. 56 F. (2d) 503, a suit was filed against a Delaware corporation doing no business there and having no office in the state except such as was necessary to maintain corporate existence. All other physical manifestations of the corporation were in Illinois. Relief was granted by the Illinois court against manipulation of shares of stock, disposal of assets, wrongful interference with corporate functions. The Illinois court said, "In such instances courts are not warranted in declining to exercise jurisdiction merely because the act complained of involves internal affairs and management of the corporation."

In Harr v. Pioneer, 2 Cir. 65 F. (2d) 332, a Delaware corporation had its offices in New York, and the internal affairs were involved. Jurisdiction assumed by the New York court was denied because of prior Delaware decisions.

In Stabler v. El Dora Oil Company, 150 P. 643, a *mandamus* was issued in a California court against an Arizona corporation and its directors to call a stockholders' meeting. The suit was sustained as proper by the California court. Here the subject matters and parties all were in California.

In General Sherman v. Burris, 172 Wash. 142, a Nevada corporation had offices and officers in Washington and real property in California. Relief was granted by a Washington court to recover misappropriated property from the president of the corporation.

In Voorhees v. Mason, 245 Ill. 256, the suit was against directors of a Delaware corporation for accounting and restitution for issuing stock to themselves at fifty cents on the dollar. The court in Illinois, where the corporation transacted its business, was held authorized to decide the suit.

Other cases, involving different kinds of suits, in which it was held that the higher court had jurisdiction in the state where the suit was filed, and in which the corporation transacted business are, as follows:

Knox Terpezone Company, 215 N. Y. 259 (New Jersey corporation with offices and officers in New York, transfer of stock on the books ordered); Evans v. R. W. Evans & Company, 284 Pa. 126 (Delaware corporation in New Jersey, transfer of stock ordered); Cochran v. Shetler, 286 Pa. 226 (receiver appointed for Delaware corporation in Pennsylvania); Conerty v. Butler County Company, 301 Pa. 417 (*mandamus* for inspection of corporate books of Arizona corporation in Pennsylvania granted and affirmed); Balch, 7 F. Supp. 420 (Delaware corporation had its business office and records in Oklahoma. The board of directors issued large amount of stock for alleged personal services. The Oklahoma court ordered an accounting and cancellation of the stock but held receivership unnecessary); Saltz v. Saltz Bros., Inc., 65 App. D. C. 393 (Connecticut corporation with all its business in Washington, D. C., petition for receiver denied by court of District, was reversed. The testimony showed that the corporation was incorporated for reasons of convenience in Connecticut); Potter v. Victor Page, 300 F. 885 (foreign corporation, all matters and activities in form, solvent, but losses threatened. Receiver appointed to conserve assets, liquidate property and distribute its local property).

Wait v. Kern Mining Company, 157 Cal. 16 Arizona corporation had office, business and property in California. The court held; "Defendant corporation was organized under the laws of Arizona. But for all practical purposes, according to the record, it is a California corporation. Its contemplated business was all to be transacted in this state, all its property is here, and it does business nowhere else. . . . Under such circumstances its residence in Arizona, or anywhere else outside of California, is the merest fiction."

Interstate advantages

There are various and many advantages to gas corporations which transact interstate business, rather than intrastate. Such advantages relate to lower taxation, the collection of damages from carriers for merchandise lost in transit, the Fair Labor Standards Act, injury suits, etc., etc.

Fortunately last month the higher court rendered an important decision involving this law.

For example, in Standard Corporation v. Motor Specialty Company, 57 N. W. (2d) 706, the testimony showed these facts: A state law of Wisconsin provides that no foreign corporation shall transact business in the state until it files, in the office of the Secretary of State, a copy of its charter, and receives a license to do business in the state.

A purchaser while on a trip signed a contract in Wisconsin with a manufacturer located in Wisconsin to purchase 100,000 motors at $2.91 each. The contract specified that the motors were to be shipped f.o.b. Racine, Wisconsin. Further testimony showed that the purchaser's principal place of business is New York, but it also maintains branches in Chicago and Los Angeles. However, it has no place of business in Wisconsin and has no officer, agent, or employee located in that state. The manufacturer, pursuant to the contract, manufactured and shipped, f.o.b. Racine, a few of the motors but refused to ship the balance of the order. The purchaser in New York sued the manufacturer in Wisconsin for damages.

The manufacturer contended that as the purchaser, a foreign corporation not licensed to do business in Wisconsin, the above state law rendered the contract void and also prevented the manufacturer from being liable in damages to the purchaser for breach of the contract. In other words, the manufacturer contended that the fact that the purchaser had signed the purchase contract while in the state of Wisconsin, and the motors were shipped f.o.b. Racine, the transaction was intrastate, and not interstate. Also, the manufacturer argued that because the contract itself did not specifically state the point of destination outside of Wisconsin to which the motors were to be shipped, some of the motors might have been shipped to the purchaser at some other points in Wisconsin, in which case there would be a transaction involving intrastate and not interstate commerce.

The higher court held that as the purchaser has offices and is located outside Wisconsin although he signed the purchase contract in Wisconsin intrastate commerce was not transacted. Also, as all shipments were to be made f.o.b. Racine, and the purchaser mailed payments for the mer-

Turn to page 37—PARKER

American Gas Journal FEATURE

Mechanized meter operations

Current GAS METERING Topic

HOW far should meter repair shops go toward complete mechanization?

The extent of mechanization that can be utilized in any plant depends on the quantity of work to be produced. A plant producing thousands of units per day can use mechanization to a much fuller extent than a plant producing only a hundred units. The extent of mechanization also depends on whether a plant is producing single simple units or a combination of a more complex assembly. The meter repair shop comes under the complex assembly category. Therefore, mechanization is more limited than the meter manufacturer producing parts and assembling complete meters.

Why should meter repair shops consider mechanization?

Without mechanization in one or more of its various forms, meter repair costs can skyrocket completely out of sight. This increase in costs would reflect on charges to customers. Labor costs have risen during the past 15 years, emphasizing the importance and necessity of offsetting this increase by mechanization, tending to keep overall costs more stable.

To achieve volume production, it is necessary to centralize meter repair activities. Most gas companies have centralized meter repair shops; there are still a few operating scattered small shops.

Decentralized meter shops are economically unsound because of duplication of efforts, especially in the supervisory classifications. Centralized meter shops permit high production, low labor cost, full use of equipment. All meter repair shops, regardless of size, can produce more work at lower cost using modern production methods or mechanisms to meet individual requirements.

What forms of mechanization can be used in meter repair shops?

Mechanical or automatic equipment that can be used in meter repair shops are conveyors—gravity rollers, moving belts and trolley type; meter opening machines—gas, electric heat induction and electronic heat induction; meter washing apparatus; paint spraying equipment—manual or completely automatic; paint drying equipment; automatic proving devices—varying from quick connectors to fully automatic devices, including such things as automatic zeroing devices.

Each machine or device will increase production and will result in a saving in manpower and an ultimate reduction in costs.

Which devices can be used in a specific meter repair shop?

Each repair shop has its own problems that can be solved only by the persons operating the shop. However, comparison of operations with those in similarly sized shops should be made. Study of work methods, establishment of a work method training program and time studies are essential.

The Cincinnati repair shop is of medium size, capable of repairing 40,000 meters per year.

The first mechanized device was a meter washing machine. Previously, only the shells of the diaphragm repair meters were washed and the production rate was 60 meters per day. The other 4 classes, "o.k.", "readjust", "partial" and "general" repairs were not washed and often it was found necessary to condemn meters because of excessive rusting. This meter washing apparatus was designed to wash all meters before repairing.

Without the machine, 3 men instead of one would have been needed to wash all meters. The production rate was 240 meters per day instead of the expected 180. The result was washing all meters for less money than for washing only a third of the meters that should have been washed. This machine was designed and built at a cost of only $200.

A heat induction machine desolders tops, cases and index boxes. Previously, the production rate for removing tops and back plates was 138 meters per day. After installation, the rate was 200 meters, an increase of more than 40%. The production rate for removing cases was increased from 128 meters per day to 240 meters per day. Besides the increase in production on these 2 operations, the machine was responsible for increasing the production rate on the tinning operation from 133 to 200 meters per day.

Adding a paint spraying booth and conveyor increased production from 135 meters to 233 meters per day.

The installation of quick connectors on meter proving equipment increased production on intesting and adjusting by 7%. Using automatic zeroing valves on provers increased production by an additional 7%, or 14% by installing these two improvements.

Each device not only increased production and decreased costs, but decreased physical effort put forth by workmen. They are not nearly as tired as they were when performing these duties manually.

This is a condensation of a presentation by R. A. Seifert, The Cincinnati Gas & Electric Co., at American Gas Association's 1954 conference on distribution, motor vehicles and corrosion. For details, communicate with AGA Operating Section. Reference: DMC-54-6.

Stray cathodic protection currents

Current PIPE PROTECTION Topic

THE use of rectifiers to combat corrosion is a rather recent development when compared with galvanic anodes and protective coatings. Unlike earlier developments, the rectifier has dangerous secondary effects—stray currents—which can endanger other underground properties if installations are not properly engineered. Detection of stray currents and the adoption of some testing procedure for determining protection against them have been of grave concern to both those who own and operate rectifiers and those who are affected by stray currents from them.

The rectifier has been considered by some to be a cure-all for any corrosion trouble. Its indiscriminate use has led to isolated cases of misuse. Its increasing use now makes it necessary to have an appreciation for the areas and structures that are affected when rectifiers are installed. A set of rules is needed to guide those who own and operate rectifiers in their cooperative tests with those who are affected by stray currents.

When rectifiers were first introduced, their capacities were small and they were used to protect small and isolated sections of pipeline. Little interference was experienced, effects were small and confined.

The next logical step was to place entire pipelines under rectifier protection. This was done first on completely coated lines where foreign line crossings are not numerous.

At present, the rectifier has come into its own and is being used to protect old as well as new transmission and distribution systems all over the country. On bare lines, especially of large diameter, the current requirements are large. In metropolitan areas, it is difficult to locate a ground bed that will not affect at least one other structure.

If the present rate of rectifier installations is maintained, in congested areas stray current will be a serious problem. Rather than wait for it to become a problem, plans should be made and machinery set up to handle any difficulties.

For the past 20 years in Pittsburgh, a committee made up of all those who operate underground structures in Allegheny county studies stray currents and works out cooperative mitigation procedures. Once a month information is exchanged on changes or extensions of plant, changes or additions of stray current drainage, and areas of suspected trouble.

When a member has trouble or plans a change in his cathodic protection system, all in the area meet in the field, make cooperative tests, and work out a solution on the spot that is satisfactory to all.

The committee has no power and no money with which to operate; the fact that

problems are being considered at engineers' level is good.

It is a relatively simple matter to determine whether a structure is suffering from stray currents. Pipe-to-soil potential measurements should be made at 100 foot intervals and closer spacing near foreign line crossings. These values are plotted against survey stations on the line.

Another method is to measure and determine the direction of DC current on the line.

If stray current interference is suspected, the operators of the foreign line should be contacted and shown the results of the tests.

Anyone who operates an underground structure that is under cathodic protection should be glad to cooperate in making tests. The rectifier nearest the crossing can be shut down and the pipe-to-soil potential or current readings repeated near the crossing. If these results are not conclusive, the rectifier should be turned off and on while pipe-to-soil potential readings are being taken at the crossing.

If there is no change in the readings, then that rectifier has no effect on the pipeline.

It is usually the responsibility of those operating the rectifier to determine the resistance of the drainage wire. There are many methods of determining this from the precise engineering method of Pearson to the "cut and try" methods.

Some companies have a policy of having a set drainage (say 100 ma) at every crossing. This is probably the simplest of the requirements to fulfill.

Other companies insist upon enough drainage so that a small current is flowing to their structure at the crossing. This is measured by a McCullom Earth Current Meter and can best be done when both lines are exposed.

There are those who require that the original pipe-to-soil potential be restored. This is accomplished by shutting down the rectifier and reading the pipe-to-soil potential of the unprotected line at the crossing.

By far, the most popular system is that known as "zero swing." The bond resistance is usually calculated or estimated and a final fine adjustment made so that there is no change in the pipe-to-soil potential readings at the crossing when the rectifier current is interrupted.

A variation of this is called "negative coupling". The procedure is the same as that for "zero swing" except that the resistance of the bond is adjusted so as to give a slightly more negative reading to ground when the rectifier is in service.

For those who are planning to place a line under rectifier protection, there are many things to consider. Be sure that a rectifier is the most economical and efficient system to use, and include in calculations the cost of any stray current interference mitigation.

This is a condensation of a presentation by C. A. Erickson, The Peoples Natural Gas Co., at American Gas Association's 1954 conference on distribution, motor vehicles and corrosion. For details, communicate with AGA Operating Section. Reference: DMC-54-10.

Oxygen manufacture—1954

Current GAS PRODUCTION Topic

APPROXIMATE MAGNITUDE OF TONNAGE OXYGEN COSTS BASED ON SPECIFIED COST DATA[1]

	Approx. Plant Cost[2] ($ millions)				Approx. Cost 95% O_2 ($/T)			
	Plant Capacity—T/day				*Plant Capacity—T/day*			
	50	100	250	500	50	100	250	500
Air Products (1953)	0.57	0.82	1.57	2.56	6.78	4.99	4.13	3.51
Blaw-Knox (1953)	0.61	0.89	1.50	2.20	6.85	5.07	3.97	3.14
Elliot (1949)	0.80	1.25	2.00	3.00	9.50	7.00	5.50	4.25
Kellogg (1954)	0.7	1.05	1.8	2.7	7.64	5.84	4.35	3.43
Stacey Bros. div. Dresser-Stacey Co. (1954)	0.53	0.95	1.75	2.7	6.92	5.30	4.20	3.50

[1] Cost estimates based on following data:
Operation—24 hrs./day, 365 days/yr.
Steam—$0.40/1,000 lbs.
Cooling water—$0.01/1,000 gal.
Electricity—$0.0005/Kwh.
Labor—48 man-hours/day at $1.40/hr.
Maint. & suppl.—1.5% of plant cost/yr.
Fixed charges—10% of plant cost/yr.
No credit for by-product N_2 or side stream of 99.5% O_2.

[2] Erected plant with motor-driven centrifugal air compressors, exclusive of site and storage.

[3] For Stacey Brothers' oxygen plants.

APPROXIMATE DISTRIBUTION OF COSTS IN TONNAGE OXYGEN PRODUCTION[1, 3]

(% Cost Distribution)

	Plant capacity—Tons 90% O_2/day				
	20	50	100	250	500
Labor	26	15	9	7	4
Power	22	32	34	39	45
Fixed Charge	44	45	49	46	44
Miscellaneous	8	8	8	8	7

These tables were presented at American Gas Association's 1954 conference on chemical, engineering and manufactured gas production by C. J. Lyons and H. R. Batchelder, Battelle Memorial Institute. For details, communicate with AGA Operating Section. Reference: CEP-54-16.

Air conditioning installations

Current DOMESTIC APPLIANCES Topic

POLICIES and methods regarding installing and servicing of air conditioning equipment by Arkansas Louisiana Gas Company were described by M. S. Bolinger, assistant superintendent of gas distribution, at the distribution session, Southern Gas Association convention.

A new approach for installations was made by the northern division when personnel which normally installs ranges, water heaters and refrigerators was used to install air conditioning equipment, and the company feels that this has reduced costs.

Approximately 300 air conditioners are in the division and are serviced by regular appliance servicemen. The company has a well-trained specialist who is available when local personnel are unable to solve difficult problems. This specialist can furnish proper assistance on about 350 units if his travelling is within a 150-mile radius.

The industry generally has maintained a complacent attitude toward air conditioning installations as sources of considerable additional revenue, Mr. Bolinger said, and he explained that units can be connected, in most cases, without expanding facilities.

Arkansas Louisiana offers service contracts to customers buying conditioners, after one year of operation, for $51.00 per year, at which time the customer receives:

1. Cooling system completely serviced and put into operation at beginning of cooling season.
2. Cooling system closed down and winterized at end of season.
3. Unlimited service calls free of charge.
4. Labor for parts replacement, free of charge.
5. Two sets of filters furnished each year.

The following statistics indicate service and maintenance operations in the northern division for 1953.

Total Installations, 1953	
Conditioners operating, December 31	271
Installations completed, during 1953	122

Servicing Within Manufacturers' Warranty, 1953	
Conditioners within warranty	101
Service calls for year 1953	365
Service calls per conditioner, aver.	3.6
Parts replaced in warranty	6

Servicing Not In Warranty, 1953	
Conditioners out of warranty	170
Service calls for year 1953	581
Service calls per conditioner, aver.	3.3
Parts replaced out of warranty	37
Parts replaced per 100 conditioners	22

Total Servicing, 1953	
Conditioners serviced	271
Service calls	946
Calls per unit, aver.	3.5
Parts replaced—1953	43
Parts replaced per 100 units	16

The company has a new air conditioner service record system consisting of 5″ by 8″ open-top envelope, analysis card and service orders. Permanent unit information

is recorded on the envelope, which is used for a permanent file for all completed service and maintenance orders worked.

The analysis card is used to record cost of parts, labor and other expense, and is filed inside the envelope with service and maintenance orders.

Air conditioning supervisors and specialists are sent to manufacturers schools each year, and these men furnish training to all other employees, including the conducting of seasonal schools.

For technical details on this presentation, communicate with Southern Gas Association, 1032 Life of America Bldg., Dallas 2, Tex.

Dealer training programs

Current CUSTOMER SERVICE Topic

"MUCH has been done in dealer training, and a good deal more is being planned for the immediate future" John MacLarty, training supervisor, gas distribution department, Rochester Gas and Electric Corp., stated at American Gas Association's distribution, motor vehicles, and corrosion conference, Montreal, when he discussed the company's househeating dealer program.

A survey of 18 companies found that 12 have sponsored dealer training programs, 8 have programs in operation, and 14 plan programs. The survey was divided: fundamentals of gas and its combustion, upgrading installations, inspection, cleaning and servicing. Five companies reported programs covering all parts; 2 covered all except servicing.

Rochester has provided an educational program since 1951; 1,200 men have taken the 9-hour course. That represents 30 times the number of men in Rochester househeating service. Results have led to an indefinite continuation of the course.

The dealer program was started in 1951 by sales management, in preparation for the anticipated gas househeating boom. The two objectives were: need to upgrade gas heating installations; need to train dealers to take over an important share of servicing.

A 9-hour training course, in three evenings, was prepared, with classes limited to 30 men. Three general parts, one presented on each evening, covered fundamentals of gas and its combustion, upgrading installation and periodic inspection and cleaning. Instruction was given by training school personnel, 3 service supervisors and 2 sales engineers. All policies and important procedures were printed and distributed at the end of sessions.

The first enrollment was 263 men, but 161 belated applications were received and a repeat course was scheduled. Every year since, the company has repeated the course. Results of the program show:

1. The course was one prerequisite for joining the company's Authorized Dealer Organization. Presently, 75% of the area dealers are members. Under contractual arrangement, a dealer is classified as approved and customers referred to him by the company. In return, dealer makes installations according to standards, assumes cleaning of installed jobs, and is generally cooperative.
2. Periodic cleans and inspections—about 2,000 were assigned to authorized dealers.
3. Tools and literature issued to dealer attendants.
4. Better understanding and closer cooperation, between dealer and utility resulting in better customer-service.
5. Installations greatly improved—almost immediately.
6. Many customers rely on dealer for cleaning and service—utility service now shared.
7. Dealer training has influenced some utility servicemen—now more alert and receptive to constant training.

The dealers recently asked Rochester Gas and Electric to provide an advanced program to supplement the basic course, and the company has started a series of informational lectures. Now under way, the program offers a discussion period followed by a guest speaker supplied through equipment manufacturers. A typical meeting draws about 175 men.

Of about 3,000 new homes built in Rochester each year 85% are gas heated, and this, with installations in older homes, accounts for between 4,000 to 5,000 new customers per year. In 10 years the company has grown from 2,500 househeating customers to a present 36,000 customers, for a 1,400% increase. In the same period the original service department of 18 men has grown to 35 men. The help that dealers have provided in carrying the load is an important factor. Now all retail sales and installations are by dealers.

For technical details on this presentation, communicate with American Gas Association, 420 Lexington Ave., New York 17.

Odor intensity meter

Current GAS ODORIZATION Topic

ODOR intensities are generally measured by observing the minimum gas concentrations in which odor is perceptible in the atmosphere. For odorized gas, this value is expressed as the gas concentration in air that produces the first change from ambient, termed "threshold." This value is basic in testing; it does not represent the intensity desired in distribution systems.

It appears neither possible nor desirable to universally adopt a single odor intensity for this odor-warning-level. That odor intensity for the desired warning-level in one locality might be wholly inadequate for another locality. A standard condition of exposure has been established and requires the observer to make only one complete inhalation for each odor observation. The following scale was devised:

Scale	*Intensity*	*Description of odor*
0	No odor	None dectable
1	Very faint	Minimum, perceptible
2	Faint	Weak, readily perceptible
3	Easily noticed	Moderate intensity
4	Strong	Cogent, forcible
5	Very strong	Intense, may irritate

The room test for measuring odor intensity has been used effectively, and is designed to simulate conditions actually existing. Odorized gas is injected into a closed room until a 1% gas concentration is present; observers record the intensity and character of the odor. This test has been modified to inject odorized gas at a very low rate until observers detect the odor and the observation time is recorded. Both tests have the disadvantage of lack of portability; usually not applicable to field use.

Measurement of odorant content of gas may be taken when composition of odorant is known and sulphur content of gas is uniform.

The gas odorometer is a device that measures odor-concentration that will produce established intensity.

Most odorometers have been designed so that measured quantities of odorized gas are mixed with air furnished by a blower. Measurement of the gas concentration is either by a flowmeter or by testing the gas-air mixture with a combustible gas detector.

These are the basic requirements for an instrument to measure odor levels:

1. Self-contained power supply,
2. Explosion-proof,
3. Negligible ambient odors,
4. Precise control of gas-air supply,
5. Provision for adequate mixing,
6. Minimum velocity at odor observation point,
7. Accurate concentration measurement,
8. Simple checking of calibrations.

A new instrument was developed to meet these requirements and consists of these elements:

1. Battery-operated blower,
2. Baffled mixing chamber,
3. Sniffing chamber,
4. Aspirator,
5. Hot-wire combustible gas detector,

5a. Ammeter for measuring gas concentration,

6. Stainless steel needle valve,
7. Rheostat for blower speed control.

This instrument is made by Davis Emergency Equipment Co.

Ambient odors are minimized by aluminum and stainless steel parts. The instrument can be calibrated by operating it on mixtures with known gas concentrations. Gas-air proportions can be varied by the blower rheostat. Gas input is controlled by a precision needle valve.

This is a condensation of a presentation by R. L. Coryell, Consolidated Edison Company of New York, Inc., at American Gas Association's chemical, engineering and manufactured gas production conference. For details, communicate with AGA Operating Section. Reference: CEP-54-12.

Price Indexes of Gas, Other Fuels and Electricity

INCREASES in GAS RATES were recorded in May for Charleston and Huntington, W. Va. Changes in thermal content of gas in 10 other cities were also reflected in the May index, issued by the U. S. Bureau of Labor Statistics.

ELECTRICITY RATES were unchanged but fuel adjustments caused minor fluctuations in net monthly bills for 3 cities.

BITUMINOUS COAL PRICES declined in 14 of the 26 cities surveyed by BLS. These seasonal declines ranged from 25¢ to $1.75 per net ton.

ANTHRACITE PRICES had seasonal declines in 8 of the 9 cities surveyed; cuts were as deep as $2.83 per ton in Philadelphia. Overall, the average decrease between April and May was 5.5%. The level is now 4.6% below May, 1953.

FUEL OIL PRICES dropped in 9 cities. Reductions ranged from 13.5¢ in Philadelphia to $1.28 in Grand Forks, N. D., per 100 gallons. The May index is down 2.1% from April.

Source: Bureau of Labor Statistics, U. S. Department of Labor (1947-1949 = 100.0)

	1954					1953								
	May	Apr.	Mar.	Feb.	Jan.	Dec.	Nov.	Oct.	Sept.	Aug.	July	June	May	Jan.
GAS														
Space heating	114.5	114.1	113.9	113.7	113.6	113.6	113.5	112.8	112.4	112.5	111.2	111.2	110.9	108.9
Non-space heating	108.9	108.8	108.8	108.8	108.8	108.8	108.8	108.2	108.0	108.0	107.1	107.2	107.0	106.4
Natural														
10 therms	100.0	99.9	99.9	99.9	100.0	100.0	99.8	99.9	99.8	99.8	98.6	98.7	98.5	98.3
25 therms	112.6	112.3	112.3	112.2	112.2	112.2	112.2	111.4	111.3	111.3	110.1	110.2	110.0	108.9
Manufactured														
10 therms	109.4	109.4	109.4	109.4	109.4	109.5	109.5	108.2	108.1	108.1	107.4	107.4	107.4	106.9
25 therms	109.5	109.6	109.6	109.6	109.6	109.7	109.7	109.1	109.0	109.1	108.4	108.4	108.4	107.8
Mixed														
10 therms	96.4	96.4	96.4	96.4	96.4	96.4	96.4	96.4	96.0	96.0	96.2	96.2	96.2	96.2
25 therms	100.4	100.4	100.4	100.4	100.4	100.4	100.4	100.4	99.9	99.9	100.0	100.0	100.0	100.0
All types combined														
10 therms	105.3	105.2	105.2	105.2	105.3	105.4	105.3	104.8	104.7	104.7	103.9	103.9	103.8	103.5
25 therms	112.8	112.6	112.6	112.5	112.5	112.5	112.5	111.8	111.7	111.7	110.6	110.7	110.5	109.6
ELECTRICITY														
Composite	102.0	104.5	104.5	104.4	103.8	103.8	104.2	104.2	104.1	104.1	104.0	104.1	104.7	104.4
SOLID FUELS														
Bituminous—All sizes combined	117.2	119.5	120.6	120.6	120.7	120.6	120.4	120.2	119.5	118.3	118.0	117.3	117.6	119.8
Anthracite—All sizes combined	123.1	130.2	135.0	135.0	135.0	135.0	135.0	134.9	134.8	133.7	133.1	130.6	129.1	135.9
PETROLEUM														
Fuel oil No. 2	118.1	120.6	122.1	123.2	121.9	120.9	122.7	122.5	120.2	120.3	120.2	117.9	118.2	116.6

THE INDEX of retail prices of fuels and electricity, issued monthly by the Bureau of Labor Statistics, U. S. Department of Labor, considers specific consumption quantities of gas, 10 and 25 therms, representing typical usage by families represented in the Bureau's Consumer Price Index.

Monthly gas bills, net, are basis for computing the index. Data are collected in these cities:

NATURAL GAS	Detroit	New York
Atlanta	Houston	Pittsburgh
Baltimore	Kansas City	St. Louis
Cincinnati	Los Angeles	San Francisco
Cleveland	Minneapolis	Washington
MANUFACTURED GAS	Portland, Ore.	
Boston	New York	Scranton Seattle
MIXED GAS	Chicago	Philadelphia

The index for electricity is based upon data collected in the same list of cities.

Anthracite prices are collected in 9 large and small cities; bituminous prices in 26 large and small cities; fuel oil No. 2 prices, from 11 cities.

The base period of the index is the average for the years 1947, 1948 and 1949. That average is referred to as "100.0."

Month-to-month net retail prices and applicable taxes are compared with the base, and computed to express, as an index number, any change from the base. While these indicators are numbers, they may be interpreted directly as percentages of change from the base period.

Examples: A current index number of 121.8 indicates a 21.8% increase from the base period; an index number of 96.4 indicates a decrease of 3.6% from the base period. This percentage comparison is applicable only from the current index to the base period.

Percentages of change from one index number to another comparable index number, other than the base (100.0), can be calculated: Subtract the older number from the new number, then divide the difference by the older number.

Examples: Older number is 115; newer number is 125; difference is 10. Divide 10 by 115; answer is 0.0869, or an 8.7% increase. Older number is 125; newer number is 115; difference is 10. Divide 10 by 125; answer is 0.080, or an 8.0% decrease.

Index of Yields: Selected Utilities Stocks

Expressed as percentages

	1954							1953							
	July	June	May	Apr.	Mar.	Feb.	Jan.	Dec.	Nov.	Oct.	Sept.	Aug.	July	June	Jan.
Transmission companies	4.25	4.04	4.08	4.15	4.17	4.25	4.21	4.39	4.44	4.44	4.90	4.46	4.76	4.72	4.04
Transm. & distrib. companies	4.88	5.01	5.01	5.11	5.27	5.39	5.39	5.54	5.49	5.58	5.74	5.13	5.41	5.55	5.02
Manufactured & mixed companies	4.36	4.45	4.46	4.67	4.68	4.66	4.66	4.91	4.75	4.94	5.14	4.99	5.06	5.08	4.87
Class "A" electric companies	4.31	4.60	4.64	4.70	4.68	4.92	4.92	5.10	5.15	5.14	5.41	5.27	5.41	5.53	5.08
Class "B" electric companies	4.78	4.83	4.94	4.94	4.93	5.01	5.14	5.23	5.14	5.37	5.61	5.50	5.41	5.68	5.19

This is a straight arithmetical index of comparative yields obtainable on a selected group of gas and electric utility industry common stocks.

The companies comprising this index have been selected by the AMERICAN GAS JOURNAL as providing a representative cross-section of each industry, from the standpoint of geographical diversification and of the relative importance of the individual companies in their areas.

No effort has been made to weight the average to give effect to changes in capitalization or in dividend rates because the yields afforded on the issues reflect such changes. The index is designed to show the rate of return and not necessarily market movements on the stocks comprising it.

This index is compiled from: natural gas transmission companies, 5; natural gas transmission and distribution companies, 5; manufactured and mixed gas companies, 4; class "A" electric companies, 4; class "B" electric companies, 5.

Moderate Business Improvement Expected to Run Through 1954

By **John F. Falvey**
Financial Editor

SECURITY holders and business generally have been taking heart from improving economic conditions and from the somewhat better than anticipated Treasury showing for the fiscal year just ended.

The budgetary deficit of $3,029 million was about 10% below expectations and the $152 million deficit on a cash basis was practically non-existent.

From current indications, the Treasury should easily cut the deficit for the fiscal year through next June 30 well below the 3 billion dollar level. If this result is achieved, the Treasury will have succeeded in taking in stride the approximately $10 billion decline in Federal expenditures from the recent peak.

A 10% reduction in industrial output such as had been looked for seems to be giving way to an upturn whose scope has not yet loaned itself to accurate appraisal. However, it is significant that the number of persons employed has been maintained at about a 61 million level, which is around 1 million higher than the average of 1950. At no time has the number of unemployed reached 6%.

The legislative program and other policies of the Washington Administration, and knowledge on the part of business that the Administration is thinking in terms of economic realities, have far-reaching implications. The ability of business management and labor to get together is promoted by the assurance that no official roadblocks will be placed in the path of moderate price increases necessitated by higher labor costs and required to maintain profit margins.

Corporate earnings for the first half year were just about what was expected, coming within 1% of the 1953 half-year level. Even though lag in steel industry output and price cutting in the important petroleum industry might pare net returns somewhat more in the current quarter, it seems reasonable to assume that earnings will be maintained at about twice the level of dividend distributions.

The rising trend of non-cash deductions is adding to the financial strength of the corporate economy and a more comfortable cash position could lead to more favorable dividend policies once business is convinced the upturn in new orders will be continued.

At the half-way mark, 1954 looks like the second best year on record for the country; and all present indications point to furtherance during the closing 6 months of the moderate business improvement which has been in evidence since the low point was touched last March.

Basis for this favorable forecast is afforded in continued high consumer spending, despite unemployment of nearly 3½ million; a construction boom, with full year's outlay of around $36 billion or 2% over 1953; reduction of inventories of certain goods to a point where production will be increased to meet demand; easier credit, both for business purposes and consumer purchases; increased Federal guarantees for mortgages and easier credit for housing; faster plant and equipment write-offs under the new tax bill; more Government stockpiling of critical materials; record personal savings; record vacation travel, bringing a boom to service trades; and increased military spending.

Admittedly, all is not on the rosy side. Farm income will be lower this year; the automobile industry is not expected to do as well in the second half year as in the first 6 months, when 3 million cars were turned out; and inventories, while reduced, still are high—with manufacturers' stock at around $45 billion, off about 1 billion dollars from a year ago.

But, on balance, the favorable factors loom larger than the unfavorable ones.

A revived upsurge in private residential construction is providing most of the steam behind the persistent rise in construction activity. The center of this pickup is to be found in home building under Veterans Administration guaranteed mortgages requiring no down payment. If the practice, as most mortgage lenders believe, is unsound, the headaches come later.

Of the 447,000 private dwelling units started in the first 5 months of 1954 the VA underwrote 19%. In the corresponding 1953 period the VA underwrote only 12% of the 451,000 units then begun. Federal Housing Administration-underwritten private construction has declined slightly and conventionally financed home projects have shown a larger decline.

The large and rising number of requests to the VA for appraisals indicates clearly that the easy VA mortgage financing is still gathering impetus.

Yields on corporate bonds have been reduced by about 20 basis points during the first 7 months this year. Recent bond issues have been well received and an orderly procession of new issues coming to market augurs well for the trend being continued.

Leading stock averages, used to measure prices, currently at levels not previously reached since 1929 include chiefly stocks of the highest investment rating which have reflected strong and steady investor demand.

In contrast, many of the less seasoned and more speculative shares have not fared as well. The Standard & Poor's average of low-priced stocks at last report was lower than in the first half of last year and all of 1952, and far under the peak level of 1946.

But thanks to increased demand for the investment type shares, the average price of all the 1,022 stocks listed on the New York Stock Exchange had an appreciation of 17% during the first half of 1954. A better than average performance was shown by 29 groups, while 15 had a performance similar to the whole market. There were 45 groups that did not fare as well as the average, while 5 lost ground.

The return on common stocks currently is well below the year-earlier level. The Moody's Investors' Service index of 125 industrial company equities now is yielding only 4.54%, compared with 5.44% a year ago. In the same interim the return obtainable on electric utility industry common shares has dropped to 4.58% from 5.46%; and the yield on natural gas equities has dipped to 4.81% from 5.47%.

Strong as the improvement has been, it might not have run its course, since a strong bond market exerts a pull on a cross section of common stocks of investment quality, as investors are willing to surrender something in the way of safety to obtain somewhat more liberal yield.

With few exceptions, the decline in business has not been matched by a similar lessening of the ability of sound companies of major importance to maintain dividend payments at current rates. As the bond market moves ahead and new refunding issues for both bonds and preferred stocks are planned, the value placed on common stock dividends tends to rise. Investors are beginning to recognize that with provision for depreciation and accelerated amortization the largest source of funds for corporations, balance sheets will be stronger rather than weaker as business emerges from the recent run off.

INDEX OF YIELDS:
SELECTED UTILITIES STOCKS
See bottom of facing page.

Pacific Northwest gas swings on economics

THE PACIFIC NORTHWEST natural gas situation has become a "Pandora's Box."

While Federal Power Commission has rejected the request of Westcoast Transmission Corp. to reconsider its decision awarding to Pacific Northwest Pipe Line Co., the coveted certificate to bring natural gas into Oregon and Washington, there is no definite assurance at this writing that the corporation will be able to construct the line for which it has been granted permission.

The willingness of the big insurance companies to advance the necessary funds is prerequisite to construction of the line. (This element of uncertainty was emphasized on the editorial page of the July issue of the Gas Journal.) One of the largest of these institutions in the words of its lending officer, is opposed to transcontinental gas lines, per se, on the grounds of their eco-

Turn to page 39—FALVEY

AMERICAN Gas Journal FEATURE

Old Days Recalled... from AMERICAN Gas Journal

ESTABLISHED 1859

90 YEARS AGO

August 1864

EXORBITANT GAS BILLS. *There is probably no complaint made which is more unreasonable and unjust than the frequent one that "our gas bill is exorbitant." It may occur occasionally that the meter furnished by the gas company measures the gas incorrectly, but when it does, the advantage is generally favorable to the consumer, for reasons unnecessary to explain here. When a greater quantity of gas is charged for than appears to be reasonable it will generally be found that the joints, or fittings, or pipes outside the meter, leak, or a large quantity of gas is allowed to pass through the burners unconsumed. . . . But let us consider the cost of gas light and compare it with other artificial light. The standard burner . . . consumes five cubic feet per hour . . . for a cost of 1¼ cents while the cost of 1,800 grains of sperm candles, which gives an equal light, would be 15 cents.*

50 YEARS AGO

August 1904

THE GAS MACHINERY COMPANY is under contract to construct a water gas set for the plant that is to be erected this summer at Glen Cove, L. I. (N. Y.). The capacity of the set is to be 125,000 cubic feet per diem.

AUGUST 1904

THE MAYOR OF LAWRENCE, MASS.—his name is Lynch—gives it as his judgment that the city is maintaining too many street lamps of one kind or another on public account. What a judge!

AUGUST 1904

THE AUTHORITIES of San Antonio (Tex.) are contemplating the placing on the streets of quite a number of Welsbach lamps. They will replace arc and incandescent electric lamps.

AUGUST 1904

MR. ADAMS, President of the Portland (Ore.) Gas Company, emphatically denies that negotiations for the merging of that company with the Portland General Electric Company are underway.

AUGUST 1904

THE BROOKLYN UNION GAS COMPANY has accomplished very much this season towards bettering its distributing system, which certainly needed overhauling.

25 YEARS AGO

August 1929

A MIDLAND GAS COMPANY, *always on the alert to build up the send-out per domestic meter, is planning to stage a store sale of gas-heated corn poppers during September. This company will advertise a well made corn popper at a reduced price . . . and the home service department will demonstrate a number of popped corn recipes in the store on discount days.*

AUGUST 1929

BIG NATURAL GAS VENTURE. *The Columbian Carbon Company, the Texas Company, Skelley Oil Company, and the Phillips Petroleum Corporation are backing the idea of constructing a natural gas pipeline from the Texas Panhandle to Chicago, Ill.*

AUGUST 1929

THE APPOINTMENT OF *Miss Jessie McQueen as Home Service Counsellor for the American Gas Association has been announced by Alexander Forward, Managing Director. Miss McQueen, succeeding Miss A. Deane Dowell who resigned recently, joined the association headquarters staff in New York on August 1.*

AUGUST 1929

ANNOUNCEMENT *has recently been made of the appointment of John C. Diehl to the position of Chief Engineer of American Meter Company.*

AUGUST 1929

THE FISHER GOVERNOR COMPANY *of Marshalltown, Ia., recently announced that they had purchased the Apex Regulator Company of Decatur, Ill. The Apex products are closely allied with those of the purchasing company, which manufactures a complete line of automatic pressure control specialities for steam, water, air, and the oil and gas industry.*

AUGUST 1929

THE SOUTHERN COUNTIES GAS COMPANY *has asked the California Corporation for permission to lay a natural gas pipeline, from the Huntington Beach field to San Diego, capable of handling 50 million cubic feet of natural gas.*

AUGUST 1929

THE ADVENT OF GAS *in the mains of El Paso, Tex., was celebrated with a special program sponsored by the Texas Cities Gas Company, the El Paso Natural Gas Company and the El Paso Chamber of Commerce. A special beacon 40 feet high, made of four-inch pipe, was used as a special attraction, the flame being lighted with a Roman candle by Mayor R. E. Thomason.*

AUGUST 1929

DON'T NEGLECT THE GAS RANGE. *The backbone of the domestic load is the gas range and notwithstanding efforts being made to sell other home appliances the gas range should be constantly featured. Every means possible should be employed to induce folks to do more home cooking.*

AMERICAN

Gas Fundamentals

OUTLINE

NATURAL GAS
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- *Drilling and completion
- *Methods of estimating reserves
- *Chemicals from gas
- *Natural gas conservation
- *Underground storage of natural gas

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***Chapters published since Jan. 1951.**

How to Use the Material

American Gas Fundamentals *is a comprehensive compilation of basic gas facts to guide any gas utility employee toward a broader understanding of the industry as a whole.*

The series is designed to be removed from each current issue of AMERICAN GAS JOURNAL *and filed in a ring binder where it may be accumulated into a text book of permanent usefulness. Material should be filed under the major subject head appearing in the upper right hand box at the head of each chapter.*

AMERICAN Gas FUNDAMENTALS

UTILIZATION

A CONTINUING EDUCATIONAL AND REFRESHER COURSE IN GAS TECHNIQUES, OPERATIONS AND MANAGEMENT

Industrial Heat Processing with Gas

APPLICATIONS of gas to industrial processing range in character from the soft touch of a powder puff to the intense impact of an hydraulic press. It is very properly regarded as a tool, rather than just as a fuel, by the engineers who are charged with the responsibility for improving industrial production methods, improving product quality, making more products, making new products and doing the entire job with the best possible economy.

Only the wheel, in all likelihood, has a wider workscope than gas, throughout all industry. Its operation has become so ultra-precise, in accordance with tightening requirements, that it has created a continuing challenge for the instrument and control engineers whose devices must act at ever-increasing speeds and with ever-increasing dependability to obtain the maximum inherent advantages of gas, the tool.

The use of gas in industry has been advanced so far beyond firing boilers that such use will not get consideration here. In fact, *any* fuel will do that job well with mechanized equipment so the use of gas under boilers is dictated almost entirely by the price tag that is attached to it.

The use of gas for processing purposes is quite another matter. Very often, the price of gas is not a factor to the industrial customer; he is prepared to pay a premium price for the advantages he knows he will have if he can get gas to do his work.

Before any consideration of the dramatic processing jobs that gas is accomplishing throughout industry, a base for those considerations is essential. It is an unfortunate truth that there is not a sufficiently widespread and detailed knowledge in the gas industry about the accomplishments of gas after it has been delivered to gas company customers.

For what kinds of industrial products is gas used as a processing tool?

The fast answer is—all kinds. Fuel gas is used in heat processing solids, liquids and other industrial gases. The number of products to which gas is applied for processing purposes is so great that some experts have tried a reverse approach—name a product that *does not* require heat at some stage in its manufacture. They could not name one. (Before any readers of GAS FUNDAMENTALS jump to the conclusion they have a non-heated product in lumber, it seems the kind thing to mention that all quality lumber is kiln-dried—heat processed.)

With a preliminary impression of the scope of product applications for gas, the question of *which industries use gas* is, indeed, answered before it is asked.

Why gas is useful in industrial processing

Why is gas so useful in industrial processing that it is regarded as a tool, rather than just as a fuel?

Gas—whether manufactured, natural, mixed or liquefied petroleum—has certain physical, chemical and combustion characteristics that are not found in other fuels or in electric energy. Those basic characteristics may vary somewhat from one type of gas to another, but only in degree; they are found in all fuel gases. However, before those characteristics can be applied to work, gas must be prepared. That preparation depends upon the kind and amount of work to be done. In all cases, it must be mixed with air and in some cases the air-gas mixture must be pressurized. The proportions of the air-gas mixture, in turn, are determined for particular kinds of work and so is the pressure. Then the gas is ready for delivery to the combustion system.

It is clear, then, that the use of gas in industry requires equipment for mixing with air, pressurizing and, of course, for combustion. The manufacturers of the equipment, through their own research and development work, make equipment that gets the most out of gas when it works for industry. So, the first part of the answer to *why* really is "specialized gas equipment."

With not an iota of detraction from the accomplishments of the equipment manufacturers, first credit for the industrial usefulness of gas goes right to gas itself. Equipment manufacturers have not been able to raise the level of usefulness of the competitive liquid and solid fuels to the level attained by gas; the basic characteristics are not present in those competitive fuels.

The specialized equipment—presently available and constantly advancing in techniques—then helps gas produce the results that are the remainder of the answer to *why gas is so useful.*

Precision in industrial production—to make the point—is becoming more precise, day-by-day. Mechanical tolerances of just a few years ago are now regarded as completely inadequate. The same thing is true of time tolerances and instrument tolerances. In other words, today's production considerations are tighter and the well-informed view of the future indicates they will become a lot tighter. And that is where gas offers one of its advantages that will get more and more industrial application.

Gas, burned in modern processing equipment, is precise.

Can meet rigid laboratory requirements

When laboratory work has established that a specified temperature, applied for a specified length of time, is essential to achieve a desired result, that temperature can be produced in a dependable and continuing manner by gas equipment. An example will emphasize this: In the modern, high-speed and continuous production of tinplate, the microscopic deposit of electrolytic tin can be fused to the steel strip at 485F. At 480F there will not be fusion and at 490F the tin will burn and discolor. Gas equipment is producing high quality, fully-fused tinplate within that narrow temperature tolerance at the rate of

better than 1,800 feet per minute. And, if a hairline were scratched across the width of the strip, that hairline would be within the zone where heat is applied for exactly one second. Yes, gas is precise and it has also given a new meaning to the term *temperature tolerance* in production work.

Reproducibility is an infrequently-used word that, in industry, means the capability of repeating a given set of operating conditions and results, from time-to-time, exactly as they are required in production. There is nothing unusual about production-cutting of pieces that are 6″ and 12″ long and changing from one size to the other without any variation from the precise standard set for 6″ or 12″ pieces. That's simple work reproduction.

Gas offers a very high degree of reproducibility to temperature. Modern equipment will maintain a specified temperature in production equipment, even though the rate of production may be varied. Temperature controls are coordinated directly with the rate of production, and automatic changes are made; no trial-and-error methods with resulting loss of time and rejected production. That's another reason why gas is regarded as an industrial tool.

Presumably everyone associated with the gas industry knows that gas is clean. Industrial customers appreciate its cleanliness at least as much as residential customers. In fact, they probably appreciate it more because dirt in production work usually implies a product-cleaning cost somewhere along the line, so it's a direct dollars-and-cents consideration. Then, another factor is that cleaner working conditions for employees have obvious advantages for both employee and employer. But, far bigger as a consideration, is the elimination of down-time for cleaning equipment that has become clogged with combustion deposits, inefficient and too-costly. Gas burns clean and the equipment in which it burns stays clean.

Operational flexibility is big factor

Flexibility is always important. The person who knows how to do only one job and is incapable of learning another, is in a vulnerable spot when some change wipes out his job. A car that can be driven only on a straight smooth modern (toll) turnpike is hardly worth having when it becomes necessary to drive on a bumpy, rutted detour. Well, gas is used in industry because it knows how to do a vast number of jobs and is capable of learning still more; it can be used in constant-temperature work or bounce around to predetermined temperatures under instrument control in response to process-cycle requirements. Again, operating in modern equipment, that flexibility is highly dependable.

At this point, an interesting example is appropriate: The process applied in one stage of petroleum refining requires the application of *temperature a* to the crude oil for *x seconds;* then *temperature b* for *y seconds* and finally *temperature c* for *z seconds.* Those time-temperature relationships were worked out in the laboratory to get a certain quality of product. The laboratory work also showed that any variation would give anything from an inferior to a worthless product; but the possibility of higher-than-anticipated quality remained a factor that might be revealed by the strictest-possible adherence to the lab's time-and-temperature requirement.

Equipment was designed to do that heating job, continuously in a tubular heater, which involved still other considerations: pressure of the liquid going through the tubes and its viscosity. That equipment, designed for the use of gas and specialized gas equipment is now producing a quality that is higher than the laboratory thought would be possible in high-volume production equipment.

Industry heats all sizes and shapes of things, in production lots. Both size and shape will be fully contrasted by noting lipstick containers and diesel locomotive crankshafts.

Production line heating

Gas has been responsible for the introduction of production-line heat processing in industries that were formerly fettered by the economic and production disadvantages of heating their products in batches. Now, production-line heating is coupled directly with the production-line manufacturing stages that precede and follow heating; no more waiting for heating to catch up with the highspeed mechanical work. Of course, that is not to say that all batch heating is outmoded; some processing can be done only in that way for specific individual reasons.

A highlight mention of sizes-shapes-and-things will illustrate some of the applications of gas for industrial heat processing: continuously moving strips of metal, textiles, paper . . . continuously moving rods, wire, pipe, tubes, billets . . . continuously flowing liquids and gases . . . continuously moving tin cans and tanks . . . continuously moving strips of glass and glassware . . . the lipstick containers . . . production-line meat carcass singeing . . . the locomotive axles . . . ceramic ware. . . .

That fugitive single product that is *not* heated can't be found, so the list would be infinite.

There is a widely-held and erroneous impression that most of the uses of gas are by large industrial companies that use large volumes of gas for high volumes of their production. There is no pattern of size of company that uses gas for processing. Large companies might well use gas only for a small but critical processing stage; they might use it for a vast number of operations. Small companies place the same technological values on gas if they know, or they will if they are informed, about its advantages.

The disadvantage

What disadvantage is associated with gas, in the minds of industrial customers and prospects?

With all the attributes of gas for industrial processing, it might well seem that the disadvantages, if any, would be so minor that they would not merit mention in this summary. Unfortunately for our industrial economy, there is a major disadvantage that hampers a potential application of gas throughout the manufacturing industry. That is the disadvantage of interruptible gas service.

Industrial firms may get gas from one or more of these sources:

Natural gas pipelines,
Distributing gas utilities,
Their own liquefied petroleum gas plants,
Their own gas generating plants.

Most industrial firms, quite obviously, must look to the pipelines and utilities for their gas. Only the larger, but not necessarily largest, firms will find that it is economic to have their own LP or generating plants.

The disadvantage of interruptible gas service relates to pipelines and utilities because those 2 facilities have a

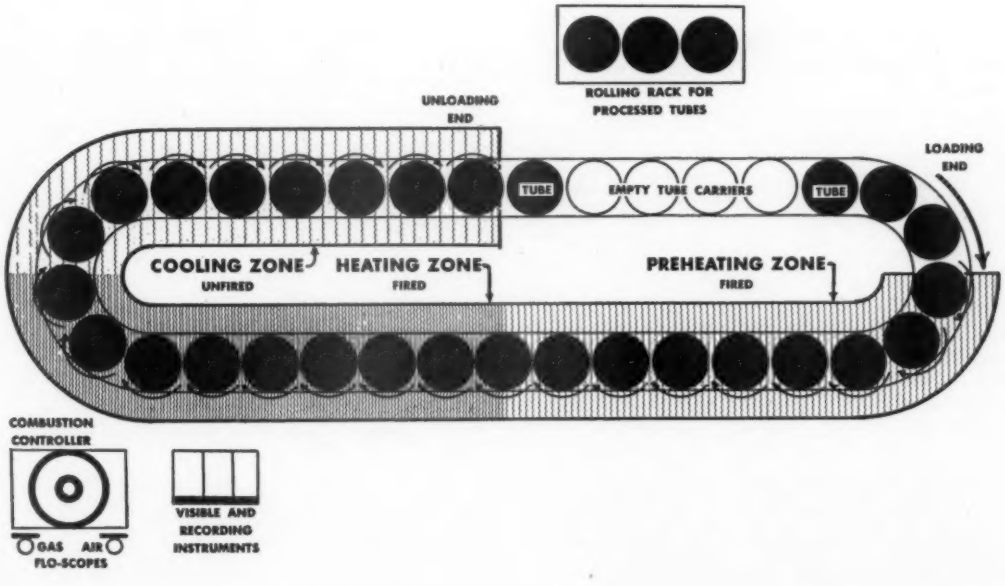
public responsibility to provide gas first to homes, schools, public buildings and hospitals, for cooking, hot water and heating. That responsibility is under the jurisdiction of state regulatory commissions and Federal Power Commission.

Any gas that is available and is not required for the essential services, may be delivered to industrial customers. However, if the demand for gas by the essential customers increases due to cold weather, the pipelines and utilities are obligated to curtail or shut off the gas to those industrial customers to the extent required to meet that increased demand.

That is a disadvantage to the individual industrial customer, to the overall production of our industrial economy and it is a disadvantage to the pipeline or utility. But, as things stand, there does not seem to be a ready-solution, even though the problem has been given and is still getting gas industry attention.

The disadvantage of interruptible gas service is limited almost entirely to the industrial firms that are located in the cold Northern parts of the country. Plants that are located close to the natural gas production areas are not faced with the threat of interruption of service.

Now, after considering what gas can accomplish in industrial processing, it will be clear that these interruptions in service would have serious consequences. In some cases, due to complete dependence upon gas, plants or parts of plants will be shut down until gas service is resumed. That results in labor layoffs, lost production and even spoilage of unfinished work that is in process. In other cases, the customers will shift from gas to oil with enforced toleration of such considerations as slower production, compromises in product quality and higher production costs. Of course, there is also the consideration of letting the vigorously competitive oil industry get inside the door of the gas industry's market.



A simplified diagram of gas-fired heat processing equipment that is used to bake the conductive- and fluorescent-coatings on 14"-24" television tubes, either all-glass or glass-and-metal.

The equipment includes recognition of a vast number of physical, mechanical, time and temperature requirements that were met fully by gas and gas equipment for this industry, just as they have been met for other industries.

One operator handles this line that bakes both types of coating simultaneously at the rate of 100-120 tubes, 21", per hour.

The entire line is controlled automatically. Radiant gas burners are arranged to conform to the general shape of the TV tubes and the heat input is "shaped" to follow the variations in glass thickness, from ⅛" to ¾" in a single tube. That variation must be recognized with extreme care in heating that is as high as 450C. This continuous line replaces electric equipment and its performance records show: higher rate of production, elimination of previously-excessive breakage of tubes due to heating, baking costs down substantially due to lower operating costs and practically no equipment maintenance cost.

The experiences of the electronics industry in processing TV tubes, said to be the largest and most complicated glass shape that has been subjected to production line heating, might well be regarded as representative of the precision results that are being obtained with gas equipment throughout industry.

Protection against service interruption

The superior qualities of gas for some industrial processing operations are so high that the customers protect themselves against interruption by installing LP storage and vaporizing equipment or generating plants for high-Btu oil gas. Either way, it is an expense that relates directly to the interruptible character of gas service from pipeline or utility.

Another indication of high regard for the superior qualities of gas in industrial processing is found in the public statements by manufacturing executives who place heavy weight in favor of new plant locations where they can get a plentiful supply of gas, throughout the year, without service interruption. That amounts to a direct reversal of the situation, less than 10 years ago, when an exhaustive study of plant location with respect to the gas supply revealed that the only industries that located plants based on gas supply were those that needed tremendous volumes of gas as a raw material in the production of another finished or semi-finished product.

As a precaution against the conclusion that the outstanding results obtained by industrial gas customers are simple engineering achievements, emphasis must be given to the fact that heat process engineering is highly specialized—in fact, the most highly specialized gas industry engineering that relates directly to any of the industry's customers and their internal operations.

It is not enough, today, to just make something hot. Future chapters of Gas Fundamentals will deal with the heat processing problems, the solutions and the specific results obtained with gas in a number of the major gas consuming industries.

This chapter on Industrial Heat Processing with Gas was prepared by
Hilding H. Carlson, editor, American Gas Journal

FEDERAL POWER COMMISSION

Mich-Wis escalator disallowed, refunds ordered

The Commission issued an order directing Michigan-Wisconsin Pipe Line Co. to reduce, by approximately $4,813,800, proposed wholesale rate increases totaling $7,643,000 per year.

Concurrently Michigan-Wisconsin was ordered to refund to customers excess amounts collected while the higher rates were in effect. These refunds are estimated at $8,300,000.

Michigan-Wisconsin was allowed 6% return. They had requested 6% in initial rate filing and in a second application had asked 6½%.

The Commission refused to allow an escalator clause contained in gas purchase contracts between Phillips Petroleum Co. and Michigan-Wisconsin, assuming jurisdiction over Phillips rates by the Supreme Court decision in June. Michigan-Wisconsin buys all its gas from Phillips.

Michigan-Wisconsin contended that, because gas purchase prices were increased by Phillips under an automatic increase provided in the escalation clause, these costs should be made a part of the company's costs. The Commission countered that terms of the escalator clause were in direct violation of the Natural Gas Act. The Act provides that a change in rates made by independent producers, as defined by the Act, under no circumstances may be made effective except in the manner provided by the Act and the Commission's rules.

FPC also refused to allow as working capital a $1,500,000 minimum bank balance which Michigan-Wisconsin had included as part of its rate base.

Revenues and income—May 1954

Operating revenues of pipeline companies totaled $123,055,442 in May, 1954, and $1,509,357,038 for the 12-month period, representing increases of 12.7% and 19.0% over revenues in the like periods a year earlier, the Commission reported late last month.

Utility operating income for May amounted to $19,680,711 and $238,023,775 for the 12-month period. That was 13.9% and 18.5% higher than in the comparable 1953 periods.

Net income for May was $10,872,799, down 6.5% from May 1953. For 12 months ended May, 1954, the net of $161,460,756 represented an increase of 16.5% over the comparable 1953 period.

Gas transmission expenses, second largest operating item incurred by pipeline companies, amounted to $10,818,034 during May 1954, an increase of 16.0% over last May. Transmission expenses for the 12 months ended May, 1954, were $125,764,564 or 12.4% higher than the same 12 months of 1953.

Tennessee Gas may merge Northeastern

The Commission has issued an order affirming a presiding examiner's decision authorizing Tennessee Gas Transmission Co. to merge all the facilities of its wholly-owned subsidiary, Northeastern Gas Transmission Co.

The decision authorizes Northeastern to transfer its facilities to Tennessee. Tennessee would continue the same service now performed by Northeastern in New England. Tennessee plans to charge the same rates now approved for Northeastern.

The authorization is conditioned to require certain supplemental accounting by Tennessee to aid FPC to determine proper allocation of joint costs separately for New England.

Amends Hinshaw rules

The Commission has issued an order to prescribe procedure to be followed by companies making applications for exemption from FPC regulation under the Hinshaw amendment.

The new amendment to the rules sets forth form and contents of applications to be filed by companies seeking exemption, and requires appropriate state commissions to supply FPC with certificates showing that the company is subject to state regulatory jurisdiction.

The company will be responsible for notifying the state Commission and FPC of future operations which may make the exemption inapplicable.

Ky-W. Va. Gas Co rate increase okay

The Commission has approved a rate settlement providing for a $922,945 wholesale natural gas rate increase by Kentucky West Virginia Gas Co. The settlement disallows the proposed $1,025,455, or 21.4%, annual increase originally sought by the company. The new rates apply to sales to Equitable Gas Co., a Kentucky West Virginia affiliate, and to Louisville Gas and Electric Co.

Kans-Nebr expanding

The Commission authorized Kansas-Nebraska Natural Gas Co. to construct about 221 miles of pipeline and 2,700 hp in compressor capacity on its transmission system in Nebraska.

The Commission concurrently issued a certificate to North Central Gas Co. authorizing it to transport gas for Kansas-Nebraska from Sidney to Northport, Nebr.

The facilities to be constructed have a total estimated cost of $4,096,890. Also, 1,500 hp will be installed at a new station and 1,200 at an existing station.

Ark-La increasing capacity

An order authorizes Arkansas Louisiana Gas Co. to construct and operate pipeline facilities which will increase the total peak-day capacity of the system from 670 MMcf to 816 MMcf.

The project includes about 136 miles of pipeline and a 10,500 horsepower compressor station. The new facilities, estimated to cost $10,072,305, will be located in Arkansas, Louisiana and Texas.

Panhandle increase suspended

A proposed $12,128,000, or 18% annual wholesale rate increase by Panhandle Eastern Pipe Line Co. has been suspended pending hearing and decision. Hearings are scheduled to begin October 5.

New rates proposed by Panhandle would be over and above those rates prescribed by the Commission in its opinion issued April 15 to become effective May 1. The additional increase is based on the 12-month test year ended March 31, 1954, and is adjusted for "known changes" expected to occur by November 1, 1954. Panhandle filed the proposed increase June 30 to become effective August 1.

Disallows parts of increases by Ohio Fuel; refunds ordered

The Commission has issued an order disallowing in part, two wholesale natural gas rate increases proposed by Ohio Fuel Gas Co., and ordering the refund of excess amounts collected when higher rates were in effect.

The action reduces by $285,000 a proposed $1,800,000 annual increase, and cuts a second increase of $2,200,000 by $760,000.

The order requires Ohio Fuel to refund to wholesale customers the difference between rates allowed and those collected during February 11, 1952-March 1, 1954.

The Commission allowed a 6¼% rate of return and rejected the proposed contract demand tariff and ordered Ohio Fuel to modify its tariff rate schedule accordingly.

Issue Hope Natural facilities okay

The Commission has issued two certificates to Hope Natural Gas Co. authorizing it to increase capacity of a natural gas storage area and approving construction of a pipeline extension into gas producing fields.

The first certificate authorizes Hope to construct facilities to increase the capacity of its Kennedy storage pool by 10 billion cu. ft. to a total capacity of 30 billion cu. ft.

$8 Million rate increase proposed by Northern Natural suspended

The Commission has suspended, pending hearing and decision, an $8,128,405 wholesale natural gas rate increase filed by Northern Natural Gas.

The proposed rates would increase by 10.4% the rates which FPC allowed, effective December, 1953. The increase, based on sales for the year ended March, 1954, uses a 6¼% rate of return. The company's present rates were based upon a 6% rate of return.

News of the Gas Industry

CON ED 6-MONTHS' HEATING DRIVE ADDS $MILLION ANNUALLY

Consolidated Edison Company of New York sales vice-president, Lou Scofield, left, congratulates assistant vice president Wes Meytrott, in charge of the company's current gas sales promotion. The most intensive gas heating campaign ever sponsored by the utility it has in a little more than 6 months, resulted in sales of sufficient space and water heating equipment to add more than a million dollars to the company's annual revenue. Grouped with Mr. Scofield and Mr. Meytrott are the sales department managers, left to right: W. McNulty, Westchester; E. Slane, upper Manhattan; Mr. Scofield; Mr. Meytrott; J. Cook, sales; F. Sturz, Bronx; W. Stecker, lower Manhattan.

Okla Nat-Consol Utils Merging

Oklahoma Natural Gas Co. and Consolidated Gas Utilities Corp. have announced that a contract has been executed between the two companies which, if all conditions are met, will result in a merger of Consolidated Gas Utilities into and with Oklahoma Natural under the name of Oklahoma Natural Gas Co. The boards of directors of the two companies met late last month and authorized the execution of the contracts.

There are certain investigations and contingencies which each of the companies has placed in the contract which must be fulfilled in order for the transaction to be consummated, including the examination of each company by the other and the review of the estimates of gas reserves, the property, plant and equipment accounts, and the position of the merged company under various governmental authorities. The entire transaction must be completed on or before January 1, 1955.

Spencer Retires from NYS Natural

Carl R. Spencer, early pioneer of the natural gas industry in western Pennsylvania, retired August 1, after 43 years with New York State Natural Gas Corp. and The Peoples Natural Gas Co.

Retired as superintendent of the Oakford District of New York State Natural, Mr. Spencer began his term of service as a line walker in October, 1911. He had been Superintendent of Peoples' Armstrong District for 16 years.

Ingham Is Peoples Natural Supt

All land and geology activities of The Peoples Natural Gas Co., Pittsburgh, will be coordinated under the supervision of Albert I. Ingham, formerly chief geologist, who has been appointed to the newly-created position of superintendent of land and geology.

Prior to joining Peoples, Mr. Ingham was geologist in charge of southwestern Pennsylvania for the Pennsylvania Geological Survey, and was previously associated with Shell Oil Co. as a geologist.

Rogers Is Chief Engr of Ohio Fuel

Paul W. Rogers, chief engineer of Ohio Fuel Gas Company, was elected an assistant vice president at a recent meeting of the company's board of directors.

Paul W. Rogers

Mr. Rogers has been associated with the company for 21 years. He was named assistant chief engineer in February, 1952, and promoted to chief engineer in June, 1953.

In another Columbia Gas System appointment, Dr. Judson L. Anderson, geologist specializing in gas and oil reserves estimates, was named as an assistant to Irving K. Peck, vice president, Houston, Tex.

Dr. Anderson, who has been with Ralph E. Davis, oil and gas consultant, since 1951, did consulting work privately and for the Maryland Department of Geology, Mines and Water Resources, and was an advisor on gas development in western Maryland.

Pioneer Gas Co Plant Well Equipped

Pioneer Gas Company's newly-constructed meter shop and warehouse in Lubbock, Tex., contains the latest in equipment used in meter inspection and repair. Automatic, remote-controlled doors, all year air conditioning, air-driven tools and air-lift provers are included in the shop's modern equipment and facilities. In all, there are 11 individual repair benches, and space for four more.

Eddins Is Exec VP of Okla Natl Gas

H. A. Eddins, operating vice president, Laclede Gas Co., has been named executive vice president of Oklahoma Natural Gas Co. Also, P. K. Wallace, general superintendent of Oklahoma Natural for the past 2 years, has been promoted to operating vice president.

McElvenny Chairman of Amer Natl Cos

Ralph T. McElvenny, president, American Natural Gas Co., was elected chairman of the board of Michigan Consolidated Gas Co., Michigan Wisconsin Pipe Line Co., American Louisiana Pipe Line Co. and of American Natural Gas Service Co., subsidiaries of American Natural Gas System.

Ralph T. McElvenny

Hugh Daly

Mr. McElvenny succeeds Henry Fink who was named chairman of the executive committee of Michigan Consolidated. At the same time, Hugh Daly, vice president, was added as a new member of the board.

Mr. McElvenny joined American Natural in 1945.

Mr. Fink was a former president of Michigan Consolidated, and Mr. Daly joined the company in 1950 as an assistant secretary and was made a vice president in 1953.

Con Ed to Complete NYC Conversion

The New York Public Service Commission has approved a request by Consolidated Edison Co. of New York, Inc., to convert from mixed gas to straight natural gas in Manhattan and the Bronx, and the work, to cost $27,500,000, is scheduled to begin in mid-September.

The change will affect 1,100,000 customers and 1,500,000 appliances. When completed in 44 months, the project will complete the city's conversion from mixed to natural gas.

MEN AT WORK

GEORGE BEESE has been named plant manager, production and purchasing, *Universal Controls Corp.*

VIRGIL F. BOWYER is now manager-system gas supply, *Consolidated Natural Gas Co.*

C. W. FISHER was named assistant manager, Gas dept., Engineering and Construction div., *Koppers Co., Inc.*

C. WESTON GOODE has been appointed district manager, southeastern U. S., *Gustin-Bacon Mfg. Co.*

DAVID F. GROZIER has joined the Public Information Bureau, *American Gas Association.*

CARL H. HANNAMAN has been named manager of stores and inventory control, *Northern Illinois Gas Co.*

F. G. JOHNSON has been appointed assistant sales manager, *Bastian-Morley Co., Inc.*

J. S. JOSEPH is now chief, Project and Technical Section, Engineering and Construction div., *Koppers Co., Inc.*

ELMER R. KAISER was appointed director of research, *American Society of Heating and Ventilating Engineers.*

GEORGE E. KEMPER is now general manager, Welding Products div., *A. O. Smith Corp.*

JOSEPH J. LANCASTER is now purchasing agent, *Northern Illinois Gas Co.*

CHARLES L. MEE was named director of purchases, *Northern Illinois Gas Co.*

JESSE C. MOSS was appointed chief gas dispatcher, *Pacific Gas and Electric Co.*

RAY A. NEWBOLD was promoted to employee relations director, *Manufacturers Light and Heat Co.*

EARL G. PLAYFORD has been promoted to business promotion coordinator, *Columbia Gas System.*

CHARLES PENNYPACKER SMITH is now senior gas supply and meteorological engineer, *Pacific Gas and Electric Co.*

H. J. SMITH has been made district manager, Kansas City div., *Gustin-Bacon Mfg. Co.*

THOMAS I. STACY, has been made district sales manager, Meter and Valve div., *Rockwell Mfg. Co.*

WILLIAM L. STANTON has been named manager, gas supply dept., *Texas Gas Transmission Corp.*

WALTER A. STERMER is now industrial sales manager, *Manufacturers Light and Heat Co.*

JACK H. WALTERS is now gas products manager, Meter and Valve div., *Rockwell Mfg. Co.*

ROBERT E. WILLIAMS has been made assistant vice president, *Binghamton Gas Works, Keystone Gas Co., Inc.,* and *Home Gas Co.*

ELECTRODE

Continued from page 17

rent are many times that required to control long line currents. The costs of the cathodic protection required in high resistivity soils to assure control of localized pitting on bare lines often exceed the cost of a combination of coating and cathodic protection system. Stray current and interference problems induced by the high protection energy requirements for bare pipelines are a responsibility growing in significance and must be recognized.

Since past experience, in some regions, has shown that a particular potential measurement technique has assured adequate protection, exceptions have occurred. The discussion has been directed towards better understanding the significance of the techniques used.

The importance of a specific reference electrode location requirement is greatly diminished in low resistivity soils and where good coatings are used on a pipeline.

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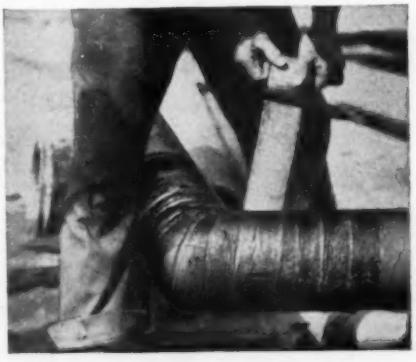

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LOAD FACTOR

Continued from page 20

This would balance out the load factor for the pipeline company and would give the utility a vast new field of income in industrial sales it cannot touch with existing firm rates.

Advantages to industry

In some industrial applications, the use of firm natural gas is essential. These industries must have natural gas and can afford to pay for such a gas service. Many industries are using natural gas because of the high quality of product they can produce with a gas fuel, the high degree of flexibility of gas and the ease of use and control.

Not all industries *have* to use gas and many of them will not use it if the gas costs more than another fuel such as LP gas or the non-gas fuels. If such industries must be on an interruptible rate which does not give sufficient savings to warrant the installation and use of suitable standby facilities, they will not use natural gas.

As opposed to this, almost all industries using heat in any form would prefer natural gas if it is available at a rate commensurate with other fuels and low enough so that they can afford to install standby plants. Therefore, the interruptible rate offers to industry the high quality fuel inherent in natural gas, cleanness of fuel, flexibility, ease of control and the advantages it may offer in the improvement of the finished product of the industry.

Proper interruptible gas rate

A suggested rate was listed in the January article as an example. Now, it might be proper to list the firm rate and the interruptible industrial rates offered by one of the large Eastern natural gas utilities. In this case the utility has had natural gas for approximately 2 years and placed the industrial rates into effect within the past year.

At least one other utility uses the "yard stick" of 1 MMcf per month as the breaking point between giving an industry firm gas and placing them on the interruptible rate. The utility having the rates listed below offers the 2 rates on an optional basis. So, for comparison of the 2 rates, 1 MMcf per month is used as the starting load:

Monthly usage MMcf	Average cost per therm—cents		Annual savings on interruptible
	Firm	Interruptible	
1	16.615	6.40	$12,258
2	15.308	5.70	23,058
3	14.870	5.30	34,458
4	14.654	5.10	45,858
5	14.523	4.98	57,258

It is doubtful that many, or even any of the large industries in this utility's service area are on the firm rate, since propane in the area is priced at about 10.9¢ per therm. That is considerably less than the average cost of the natural gas, even after the use of 5 MMcf per month. It is logical to assume, then, that this utility, like most others that hold to the belief that all gas must be sold on firm contracts, must limit the business it can get on the firm rate to those industrial customers using less than 1 MMcf

For an industry using 2 MMcf of natural gas per month:		
Annual cost of firm rate natural gas		$36,738
Cost of interruptible rate service:		
10 months at interruptible natural gas rate	$11,400	
2 months at cost of propane-air gas	4,360	
Total cost of interruptible rate service		15,760
Annual savings for industry using 2 MMcf per month		$20,978
For an industry using 5 MMcf of natural gas per month:		
Annual cost of firm rate natural gas		$87,138
Cost of interruptible rate service:		
10 months at interruptible natural gas rate	$24,290	
2 months at cost of propane-air gas	10,900	
Total cost of interruptible rate service		35,190
Annual savings for industry using 5 MMcf per month		$51,948

Steady

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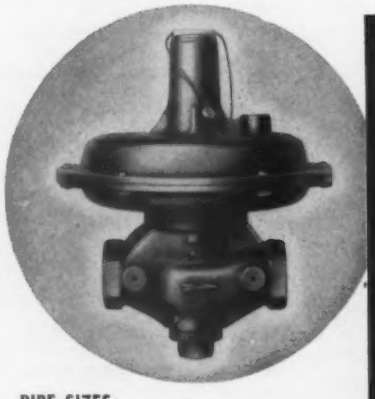

PIPE SIZES:
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¼" to 3" with screw connections
3" to 8" with flange connections

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per month and who cannot afford to install an LP gas plant.

The cost comparison above does not reflect the true annual fuel cost of gas to an industrial customer. True cost is the cost of the natural gas during most of the year when natural gas is available, plus the cost of the standby fuel. Using the cost of propane noted above as the probable standby fuel, and considering that the utility will deliver natural gas to the industry at least 10 months of the year, would give the actual annual costs shown in table on page 36.

From the savings indicated above it would seem that industries would be able to use natural gas on the interruptible rate and at the same time afford to install a suitable standby plant for use at least 2 months a year. This is the kind of inducement the utility must offer to get the kind of industrial loads needed to smooth out the unbalanced load condition caused by unrestricted gas heating installations.

Proper standby plant

Many natural gas utilities have, as a part of their interruptible rate schedule, the condition that the industry must install and maintain an accepted standby service. The utility is therefore in a position of suggesting the type of standby service most suited. There is no question but that propane-air gas offers an unequaled service.

A few of the more obvious advantages of propane-air standby gas are:

1. Propane-air gas offers the same unexcelled purity and uniformity that is inherent in natural gas.
2. Propane-air gas is completely interchangeable with natural gas in most applications, either mixed with the natural gas or as a 100% replacement of natural gas.
3. A propane-air gas plant is easily and quickly started, and once started will operate automatically with but little attention. It can be set to deliver any portion of the gas load that is desired.

In addition to those advantages, are the advantages of compressed liquid storage which reduces the amount of storage space required, and the other well-known features.

The utility has then a greater assurance of holding the industrial load, once it has sold the idea of gas as the fuel. If a dual-fuel standby service is installed, the utility must constantly face the possibility of changing economic conditions which might cause the industry to switch over to the non-gas fuel and, thereby, quickly lose the load.

Conclusion

It would seem that the natural gas utility should go over to the optional industrial rate setup, with enough spread between the 2 rates to make it profitable for industrial customers using in excess of 1 MMcf per month to go to the interruptible gas rate. This would give the industrial gas sales engineer the proper tool he needs to promote industrial sales he has so far been unable to reach.

In addition, the utility should cease thinking of LP gas as a competitor for the larger industrial gas loads. As a valuable ally, it is an adjunct in the promotion of interruptible rate gas sales that the utility could not hope to gain without the use of proper standby facilities. This includes the very great liquid fuel fields now untouched by many natural gas utilities. A cooperative effort in the sale of interruptible rate natural gas and the sale of the propane standby plant should prove of value to the utility in selling the desired volume of interruptible gas.

PARKER

Continued from page 22

chandise from its New York office to the manufacturer in Wisconsin, strictly interstate commerce was involved.

The higher court held that the transactions between the buyer and manufacturer were intrastate and not interstate, whereby the purchaser could sue and recover damages from the manufacturer for breach of its contract. This is so although the purchaser was not licensed to "do business" in Wisconsin. The higher court said, "The mere act of a foreign corporation in going into another state and there making a contract for the purchase of goods to be shipped in interstate commerce, does not constitute 'doing business' within the state. It is therefore our conclusion that the contract in the instant case contemplated shipment of the motors to a point of destination outside of Wisconsin so as to involve interstate commerce."

No favorable treatment

A reader asked this question: "Do past higher court decisions disclose that gas corporations organized in a foreign state receive relatively favorable treatment by courts in the state in which the gas corporation transacts its principal business?"

The answer is in the negative.

Generally speaking, when a gas corporation transacts business exclusively in a state in which it was incorporated, little or no controversy arises over the authority of this state to control and regulate affairs of the corporation. However, officials of gas corporations organized and incorporated in a state, different from where the business is being transacted, usually offer many objections and arguments over the authority of this state to regulate the foreign corporation.

First, it is interesting to know that the modern higher courts consistently hold that the right of corporations to take out a charter in one state to do business solely in another is too general and too long recognized to be questioned. However, the courts of a state are ordinarily reluctant to adopt a construction of the local state laws which would enable corporators to receive by reason of the foreign corporation relationship, more favorable treatment than similar domestic corporations.

For example, consider details of State v. Iowa Southern Utilities Company of Delaware, 2 N. W. (2d) 372. In this case it was shown that a utilities corporation was organized in Delaware but transacted its business in Iowa. Suit was filed against the corporation by a stockholder who contended that the corporation had violated the provi-

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sions of an Iowa state law by issuing a large part of its capital stock for something other than money, without the approval of the Executive Council of the State, without receiving par value therefor, and without certificates of the issuance of such stock with the Secretary of State, setting out the details of the transactions, and what was received for the stock. Because of these violations of the state statue, the stockholder alleged that the stock so issued was void.

On the other hand, the counsel for the corporation argued that the latter was not required to comply with Iowa laws because it was organized under the laws of Delaware. However, the higher court held the corporation bound to comply with the Iowa laws, and said, "They had no apparent intention of operating their utility plant, or of doing any other business in Delaware. Its officers, its plant and operating property, its assets, except a bank account or two, its business, almost all of its officers, its books and records, in fact, all of its physical manifestations, have always been, and are now in Iowa, within the jurisdiction of the courts of Iowa. . . . While it was, and is, in law a legal resident of Delaware, and has its technical domicile there, its 'commercial' or 'economic' domicile is in Iowa. It was conceived in Iowa, born in Delaware, and has lived its entire life in Iowa. The foreignness of such a corporation has been spoken of as but a 'metaphysical concept.' Its existence in Delaware is an illusory mirage, more atmospheric than real. Under the circumstances it is, in actuality, more domestic than foreign. The courts of this state have full jurisdiction of the parties and the subject matter with authority to grant all the relief prayed for, and the power at hand to fully enforce such decree. . . . Stock issued without authority and in violation of law is void and confers no rights on the person to whom it is issued. . . ."

The law of permits

Another important question often presented the higher courts is: When and under what circumstances is a foreign gas corporation obligated to obtain a permit to transact business in a state? Modern higher courts hold that where a foreign gas corporation is not engaged in interstate commerce, or in any work or service of the Federal government, it has no right to transact any business in any state except by complying with the statutory requirements enacted by the legislature of that state, and obtaining a permit. In other words, the law is well settled that a state may exclude a foreign corporation from transacting business within its borders or condition its admittance to do business as it sees fit, providing this state does not thereby violate its own constitution or the Constitution of the United States. This law is applicable although a gas corporation has its principle place of business in one state and it has been organized under the laws of another state. This is true although the organic power of a foreign corporation always depends upon the law of the state from which its existence is derived, or in which it was incorporated.

Hence, the decision of officials of a gas corporation to do business within certain state is not by a right, but by comity only.

WORLD CONFERENCE

Continued from page 21

this 14-year growth picture for U.S. natural gas.

"Industrial gas sales by utility companies and pipeline companies increased from 7,941 million therms in 1938 to 27,989 million therms in 1952—or 250%. That is about 95% more than the gross national product value increase of the same period, when corrected for money depreciation. This permits the conclusion that gaseous fuel has a proportionately higher importance in the United States productive plant."

The control of energy, under exacting requirements, was described as being responsible for the transition from handicraft to modern manufacturing that requires exact duplication at will.

"Control of each and every step of making a product or, realistically, at least the majority of the important factors of production," Mr. Hess stated, "is the basic foundation of modern industry. Control of energy, control of raw materials, control of manufacturing processes and procedures, control of physical and mechanical properties and performances within predetermined limits or tolerances underlies the concept of modern industry."

The American gas industry's contributions to the printing and publishing industries were used by Mr. Hess as his final example of accomplishment to the World conference delegates.

"Some 15 years ago the influence of radio made itself strikingly felt in the publication field. Printing took time because press speeds were relatively slow and drying time for the printed sheet was even slower. In comparison to radio speeds, news values were lost, news stories were late, advertising values appeared unfavorable, resulting in a general decline and a rather dim outlook.

"A combination of new inks and gaseous fuel brought about a complete reversal of the existing trend. These inks were capable of drying instantly with heat application, and automatic heating apparatus built into the printing press completely eliminated extra drying time. This feat permitted quadrupling of printing speeds and immediate folding and binding and, therefore, shipment of the finished product within seconds after printing.

"Gaseous fuel replaced time, plant investment and plant space, storage and multiple-handling. It influenced press design and was responsible for the purchase of hundreds of new high-speed printing presses.

"Gas helped to generate a development trend which completely revised the prevailing publishing technique and gained, for the industry, news value, quality, high production and lower unit production cost.

"Gaseous fuel, in this instance, influenced the reversal of an industry decline and the establishment of a strong competitive position."

RESPONSIBILITY

Continued from page 21

tively supports this system engineering, which will extend beyond melting or casting.

"Does anyone believe millions of dollars development cost will be expended on our interruptible fuel—which, by the very basis of sale, admits that performance does not justify a premium because of operational merit. The more intricate the automatic process becomes the less a 'failure' of a single process step can be tolerated; the less a substitute material can be accepted.

"In the aluminum industry, a plant is already in operation which automatically feeds scrap into a melting furnace, and from there casts, into permanent molds, various automotive, aircraft and air conditioning parts. One continuous process coordinated and controlled, between feed of raw material to weight, and number of finished castings. Because of large investments required and high production and product value, a shut-down lasting only a few days pays for the difference in fuel cost between gas and electric. What would be your decision of fuel selection?

"The chemical processing industry has probably more automatic plants than any other—largely because the process cannot be viewed in its steel containers and pipes, and under pressure. Therefore automatic controls are basic.

"But, during the production of one of our basic materials projected to increase manyfold in the next few years, a variation in time-temperature cycle of the process of only 1/5 of a second can mean a difference in yield of 15%—15% of several hundred million pounds per year. If the cycle varies in the order of 1 second, it can mean producing a product worth 25¢ a pound, or one which commands only 5¢ a pound. . . . Every single shutdown of the entire plant costs $30,000.

"No management could tolerate system engineering of such a process which includes 'interruptible fuel,' nor could they justify the development expense of the equipment to perform the precise functional requirements if such equipment requires 'fuel which has the reputation of being interruptible.'

"They could not tolerate it—if the fuel costs nothing!

"There are many other examples; those mentioned are sufficient to justify 'another look.' Since the ground work for our future productive plants is being laid now—not much more time can be lost if we are to counteract or influence the planning.

"I hope this Board sees fit to take some action which might start with a study, by a competent group, of the *actual* position of industrial gas in our technical world. Such a study will very likely bring forth and appraise the thinking of our industrial production and planning people, and clarify the responsibility we might or might not have, and be willing to assume as an industry."

Develop Ohio Fuel Storage Area

Development of Ohio Fuel Gas Company's seventh underground storage area for natural gas, in Guernsey and Coshocton counties, O., has been announced by Allan W. Lundstrum, president. The new area, known as the Guernsey storage project, will increase the storage capacity of Ohio Fuel six billion cubic feet, Mr. Lundstrum said.

On severe winter days over half of the gas used by Ohio Fuel customers comes from underground storage.

FALVEY

Continued from page 27

nomic unfeasibility, and to Pacific Northwest itself on the basis of possible insufficient gas reserves and of the unpromising economic aspects both of the line and of the area which it plans to serve.

Competition from low-priced Bunker C fuel oil, which can be laid down in Pacific Northwest ports at low price, is one deterring factor, while another is whether the proposed line can succeed in obtaining as a customer the large Atomic Energy Commission plant at Hanford, Wash. The AEC plant management has expressed opposition to the high price attached to natural gas offered by Pacific Northwest.

Another of the large insurance companies has not yet been approached with respect to financing the Pacific Northwest line. If and when approached, it will question deeply and seriously all aspects of the planned operation before committing any funds.

Even if Pacific Northwest ultimately should be unable to proceed with its plans to bring natural gas into the Pacific Northwest, such a development would not open tthe door automatically to Westcoast Transmission Corp. The Peace River fields of northern Alberta and British Columbia, to which Westcoast is restricted by Canadian edict, are as far removed from the consuming markets as the U.S. gas reserves for the certificated Pacific Northwest line. The intervening regions are sparsely settled and more open to sabotage, an important consideration when the AEC Hanford plant would be such a basically-important customers. And, the excoriation handed to Westcoast by the FPC staff in tearing apart its testimony presented at the certificate hearings would seriously undermine any hope that company might have about getting the certificate.

The most natural route—if the proceedings were reopened—would seem to be the one proposed by Northwest Natural Gas Co. This was the first company to broach the idea of serving the Northwest with natural gas, having filed its application with FPC in February 1948. Its route from the Pincher Creek, Jumping Pound and other gas reservoirs in southern Alberta would comprise the shortest link between reserves and markets. But in this instance, FPC is not the only obstacle. Another important and serious one is whether the Canadian powers-that-be would permit these logical fields to be used to provide the ever-increasing Canadian gas reserves with the markets they must have.—J.F.F.

Jones Is Toronto Consumers Gas GM

Oakah L. Jones has been named general manager of Consumers Gas Co. of Toronto, Can., and his resignation, as Tulsa district manager, from Oklahoma Natural Gas Co., will be effective this month.

Peoples Water and Gas Names VP

John C. Bolender has been promoted to the newly created office of vice president and general manager of Peoples Water and Gas Co., Fla. Mr. Bolender joined the company in 1951 as manager of operations and in 1952 was elected vice president-operations.

NEW BULLETINS

VULCAN INDUSTRIAL COATED FABRICS. Listed in this new bulletin in simple graphic form are the wide range of sizes, weights and other specifications of buna-n coatings, neoprene coatings, premier coatings, natural rubber coatings, molded diaphragms and many special purpose fabrics made by the company. The bulletin explains the uses and characteristics of each coating and presents comments on each of the various styles.

Bulletin No. SF-454. Pp. 8. Vulcan Rubber Products, 54 Worth St., New York 13.

ELECTRONIK DUPLEX FUNCTION PLOTTER. This bulletin describes the company's new duplex function plotter. The new instrument continuously measures and records, on a single chart, two independent variables as a function of a third. It incorporates three complete measuring and balancing circuits that can be energized by any d-c millivolt source. Expressed mathematically, the function plotter continuously plots x, $x' = f(y)$.

Bulletin No. 10.0-17. Pp. 2. Minneapolis-Honeywell Regulator Co., Industrial Div., Station 64, Philadelphia 44.

TRENTON MUMMY-WRAP PIPELINE COATINGS AND WRAPPERS. Descriptions of the company's three types of plastic pipeline wrappers; coatings for hot application by machine or granny-rag, and hand-applied coatings for field joints, patching and reconditioning, are presented in this bulletin. For each material, the bulletin gives details as to composition and methods of application, and lists specific advantages regarding protective properties, durability, freedom from holidays and ease of application. A line of kraft overwraps is also listed. The bulletin includes a table of material requirements for coating and wrapping ¾" to 36" pipe, and describes the company's field engineering service.

Bulletin 541. Pp. 4. The Trenton Corp., Wolverine Bldg., Ann Arbor, Mich.

DRAGNET LEAK DETECTOR. A new instrument for detecting and locating leaks in all types of pressure piping systems is described in this bulletin. The leak detector is applicable for testing piping for gas, steam, water, oil, refrigerants, air and other pressure vacuum systems. A portable unit, it consists of a test pump, air storage tank, pressure gauge, transparent bubble bowl with non-freezing fluid, and a flexible hose for connecting to piping under test. In addition to presenting information on construction and applications, the bulletin offers operation and service information.

Bulletin No. 545. Pp. 2. Universal Controls Corp., 731 W. Davis St., Dallas.

PROTECTOGLO FLAME RECTIFIER UNITS. New miniature flame rod assemblies, photocell units, pilots and other components used in the company's combustion safeguard systems for industrial oil and gas burners, are described in this new bulletin. It contains specifications, dimensions, application information and prices.

Bulletin 9604. Pp. 8. Minneapolis-Honeywell Regulator Co., Industrial Div., Station 64, Philadelphia 44.

NEW EQUIPMENT

Connection sleeve—leak clamp

Described by the manufacturer as a new system for making pipe connections, the system involves sleeves for steel to steel

connections that become welded joints, sleeves designed for use with a new compound where welding is not practical, and a new leak clamp for bell joint repairs. The sleeves for steel to steel connections reportedly will withstand pressures up to 100 lbs. before welding, through the use of a seal ring. The pipe becomes a continuous welded construction or one end welded and the other an insulated joint. There are no flanges, bolts, collars, or rings to obstruct in final wrapping of sleeves. In low and intermediate pressure ranges the sleeves are said to eliminate interruption of service, loss of pressure and the use of plug-off equipment. The new compound for use on sleeves without welding, such as cast iron to cast iron, or steel to cast iron, is made of a heavy liquid synthetic. It chemically cures in 24 hours at 80° F, after an accelerator has been added. It forms a complete seal of adhesion to the pipe, and a 2½" adhesion joint is made when the compound has been pumped into the sleeve. The same compound is used on a new leak clamp for

bell-joint repair. This clamp, of two piece construction, acts as a mold and retainer for the compound and becomes a part of a molded joint.

United Pipe Utility Suppliers, Inc., Box 777, Beloit, Wis.

Oxygen analyzer

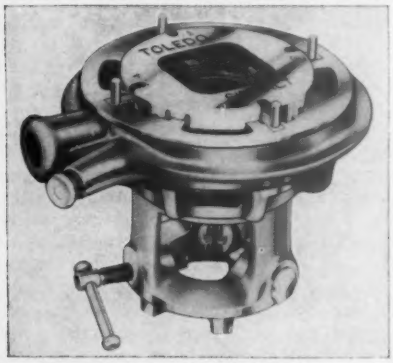
A continuous specific oxygen analyzer designed for low range measurement of oxygen in gaseous streams, this unit features specific measurement of oxygen without interference by most other gaseous

components, and offers reproductibility over extended periods. All parts which contact the gaseous sample or liquid stream are made of stainless steel or plastic. In the standard model, the light source, power switch and pump motor are explosion-proof, and all other electrical components are air purged. Available equipment includes a self-supporting panel, single point continuous indicator and recorder, circular chart recorder, flow chain cabinet with plexiglas window, and an explosion-proof circuit breaker and pump.

Davis Instruments Div., Davis Emergency Equipment Co., Newark, N. J.

Threader

The company's 1″ to 2″ self-contained ratchet threader is now offered with a new cam-type quick-action pipe holder which

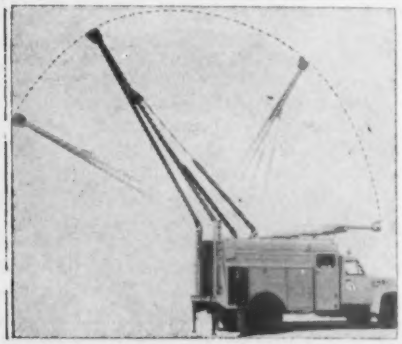


has broader jaws to permit a better pipe grip, and free action cam that sets instantly to size. Quick setting of high speed steel dies can be made to 4 pipe sizes, 1″ to 2″. Said to be compact and light in weight, the unit will thread a pipe projecting through a wall as short as 6¼″.

Simpact Ratchet Threader. Toledo Pipe Threading Machine Co., Toledo, O.

Hydraulic derrick

An addition to the company's line of hydraulic derricks, this new unit will handle poles up to 75′ in length. Movement of the



derrick is actuated by two pairs of hydraulic cylinders which are driven by a power take-off installed on chassis transmission. One pair is used for spotting the boom, the second for raising or lowering head sheave a distance of 31″. Twin positioning cylinders, attached to side legs and body roof, move boom to any point in an arc of nearly 180°. There are no pre-determined stops. Can be used with a single-drum winch. Rated capacity, with head sheave fully extended 5′ to rear of side leg pivot points, is 9,000 lbs. All movement is controlled by levers in a rear compartment of the body on which derrick is installed.

Series HD-4-70 Pole-Master. Powers-American Div., McCabe-Powers Auto Body Co., St. Louis 7.

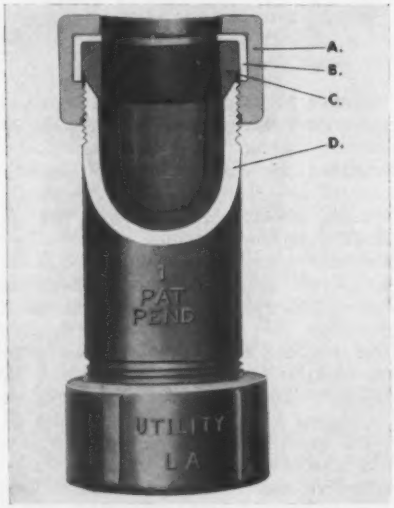
Threading machine

A new speed-grip chuck that grips both forward and reverse is featured in this pipe and bolt threading machine. The company states that the grip uses a new gripping principle. Jaws are closed with a light sock of handwheel and motor power further tightens the grip, which is released by turning handwheel. The chuck is said to aid threading, cutting and reaming operations. All tools can be used separately. Capacity is rated at ⅛″ to 2″ pipe or conduit, ¼″ to 2″ bolts. Machine with lathe-type wrench chuck also available.

Model Rigid 500A. The Ridge Tool Co., Elyria, O.

Coupling

A compression pipe coupling for connecting small pipe, this coupling eliminates thread cutting since pipe ends are simply



inserted into the factory assembled couplings and compression nuts tightened to complete the connection. Supplied in ½″, ¾″, 1″, 1¼″, 1½″ and 2″ sizes, the regular couplings have sleeve lengths from 2¾″ to 4″, increasing in size ¼″ for each larger pipe diameter. Shorter or longer sleeve lengths are available. Sleeves (D), are supplied in black, galvanized or cadmium plated steel; stainless steel; Monel, Inconel; brass or bronze. Compression nuts (A), are made of ductile iron. Gaskets (C), either rubber or neoprene, are inserted in steel retainers (B). Special gaskets available for any purpose.

Utility Clamp & Equipment Co., 108 W. 6th St., Los Angeles 14.

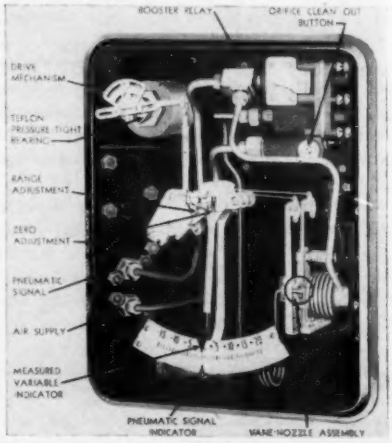
Conversion burner

Available with adjustable inputs ranging from 60,000 to 325,000 Btu/hr, this gas conversion burner reportedly fits the majority of boilers, furnaces and winter air conditioners, either round or square. The primary air control is adjustable for achieving efficient gas-and-air mixture, and secondary air control is inside the housing and can be adjusted without affecting primary air setting. Controls include timed cycling thermostat and main gas valve which has a manual opening device for operation in event of power failure. Runner-type pilot igniter permits convenient light of the pilot burner. The unit is AGA listed for manufactured, natural, mixed, butane, propane, butane-air and propane-air gases.

Stanflame Conversion Burner. American Radiator & Standard Sanitary Corp., Pittsburgh 30.

Pneumatic transmitter

A pneumatic transmitter for telemetering and control systems, this unit can be used for transmitting measurements of



flow, level, pressure, temperature, draft, differential, and vacuum. The measuring element actuates the unit's micro-sensitive vane, nozzle, and booster assembly. Transmitted signals of 3-15 and 3-27 psig may actuate pneumatic receivers and controllers. The measured variable and pneumatic signal are indicated on a common scale for checking and comparison. Transmitting distances can be 1,000 ft to receivers, 400 ft to controllers. Accuracy is within ± ½% of measured range span, and air consumption is less than 0.15 cfm.

Bailey Meter Co., 1050 Ivanhoe Rd., Cleveland 10.

Furnace

Shipped as a packaged unit, this horizontal gas-fired furnace is delivered completely assembled with all controls except

the thermostat mounted. Flue outlets on both sides of the cabinet make it possible to attach flue and draft diverter connections to either side. The burner and control assembly also may be mounted on either side of the cabinet. The blower is of the double inlet, multi-blade centrifugal type. The burner is especially engineered for use with these furnaces to operate with any type of gas. The furnace is available in four sizes, ranging from 64,000 to 112,000 Btu at the bonnet. It is suitable, the company reports, for crawl space, attic, utility room, basement,

or unit heater types of installation.

Iron Fireman Manufacturing Co., Cleveland 11.

Pipe finder

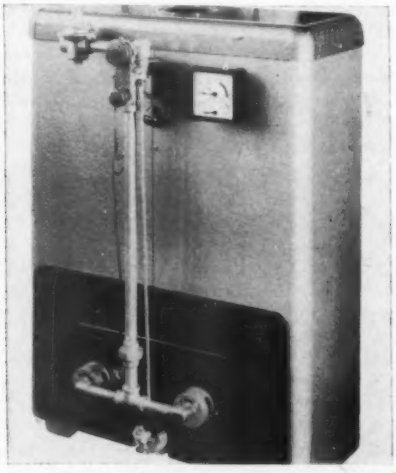
This new electronic instrument for locating and tracing buried pipes, conduits and metal objects, features a new electronic

circuit. The instrument cabinets are of moulded fiberglass said to be impervious to water, and will not scratch, stain, splinter or bend. The new circuit is insensitive to temperature changes and the shock and vibration of field use. The receiver selectivity and operational frequency make the new unit less sensitive to all types of outside interference, the company reports, particularly that associated with neon signs and overhead power lines. Tubes and batteries are standard.

Electronic Witch M-Scope. Fisher Research Laboratory, Inc., Palo Alto, Calif.

Boiler

A new addition to the manufacturer's line, this model's AGA input and gross output have been increased to 70,000 and 56,000 Btu/hr respectively, from 62,500 and 52,000 in preceding similar models. Standard equipment includes cast iron boiler with drill port burners, jacket with



glass fiber insulation, temperature control, 100% shut-off safety pilot, gas pressure regulator, drain cock, combination altitude gauge and thermometer, and draft diverter. The unit can be used with all gases, including LP.

Arrow-Line 200-U-2. Bastian-Morley Co., Inc., LaPorte, Ind.

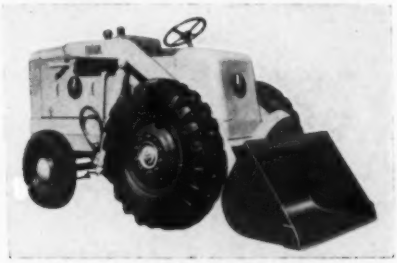
Pipe vise

Made with a built-in folding tool tray that eliminates all loose parts, this new pipe vise is available in two models: ⅛" to 2½" capacity, and ¼" to 4" capacity. The tool tray pushes down flat for set-up and extra rigidity of vise stand, and pushes up to fold in and chain the legs for carrying. The newly designed full-size base overhangs front legs to give clearance for threader handles. Equipped with 3 pipe benders, ceiling brace screw, pipe rest and tool hanging slots. Feet have rubber grommets.

Model 40A Tristand. The Ridge Tool Co., Elyria, O.

Shovel-loader

Two new model front-end shovel-loaders with torque-converter-drive have been introduced by the manufacturer. The pneu-



matic-tired, front-wheel-drive models offer, respectively, 16 cu. ft. pay-load capacity and 12 cu. ft. struck-load capacity, and 24 cu. ft. pay-load capacity and 18 cu. ft. struck-load capacity. The torque converter is of the 3-element, self-cooled type which automatically multiplies torque output of the engine in direct proportion to load requirements. The lower capacity model has

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THE FIRST REALLY New PIPE FINDER IN 20 YEARS

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The "Electronic Witch," a really new instrument, will out-perform and outlast any other pipe finder . . . with greater accuracy . . . and with more pronounced indications of buried objects . . . employs completely new electronic circuit . . . sturdy and trouble free. Write now for Bulletin H.

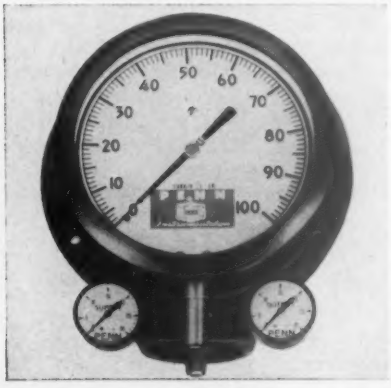
JOSEPH G. POLLARD CO., INC.
Pipe Line Equipment
New Hyde Park New York

a 2-speed, full reversing transmission providing speeds from 0 to 11 mph, and the second model has a 4-speed transmission providing speed ranges from 0 to 23 mph.

Payloader Models HA and HAH. Frank G. Hough Co., 960 Seventh St., Libertyville, Ill.

Pressure gage

A pressure gage-pneumatic transmitter which combines the direct indicating features of a pressure gage with pneumatic



transmission for remote indicating, recording or controlling of pressures, this unit is said to be suitable for outdoor, unprotected installation and may be mounted either on a 2″ pipe pedestal, wall or panel. The output pressure of the transmitter varies from 3-15 lbs., or 5-25 lbs. if specified, regardless of the range of the pressure being measured. Ranges from vacuum to 10,000 psig are available. Gages used are made in either 6″ or 8½″ sizes with bourdon tubes of a wide variety of materials. Distances up to 1,000 feet are said to be practical for remote indication or recording; up to 400 feet for control.

Penn Pressure Gage-Pneumatic Transmitter. Penn Industrial Instrument Corp., 4110 Haverford Ave., Philadelphia 4, Pa.

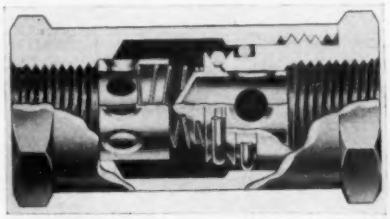
Air filter

A compact air filter designed to prevent dirt, oil, water and other foreign matter from entering pneumatic instruments, this filter consists of four major elements: a top cap with supply and outlet connections; chamber with drain cock at the bottom, resin impregnated filtering sleeve; and a water baffle. The unit measures approximately 8½″ by 4⅛″ and can be mounted in a supported line or bolted to a wall or panel. Filter capacity is 4 cfm of air or natural gas; sump capacity is 12 cu. in.; filtering area, 21.2 sq. in.; and maximum working pressure, 150 psi.

The Foxboro Co., Foxboro, Mass.

Check valve

Now available in 1½″ and 2″ sizes in addition to smaller sizes, this valve is said to provide safe operation of systems such as oxygen/propane or oxygen/acetylene, preventing unintentional mixing of the two gases in supply hoses. The standard series offers: working pressures, 0 to 3,000 psi; temperatures, —40°F to 280°F; opening pressure differential, less than 1 psi. Designed for low pressure service the ultrasensitive valve series offers: working pressures, 0 to 25 psi; temperatures, —40°F to 200°F; opening pressure differential, 4″ water column max. Valves are available in



all sizes in either brass, aluminum or steel.

Circle Seal check valves. James-Pond-Clark, 2181 E. Foothill Blvd., Pasadena 8, Cal.

Odortester

An instrument which is said to provide accurate field measurement of odor levels of fuel gases, this portable analyzer evaluates gas odors for comparison and control purposes, and can also be used to detect gas leakage since it measures gas concentrations as low as 0.1% by volume. The instrument weighs 15 lbs., measures 6½″ by 8″ by 11″, and is self-powered by batteries contained in the case. Includes a built-in combustible gas detector which measures and indicates intensities of odors, and a mixing chamber which combines the gas sample with air for olfactory testing.

Davis Odortester. Davis Instruments Div., Davis Emergency Equipment Co., 45 Halleck St., Newark 4, N. J.

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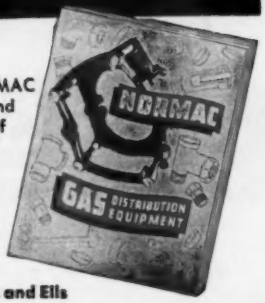

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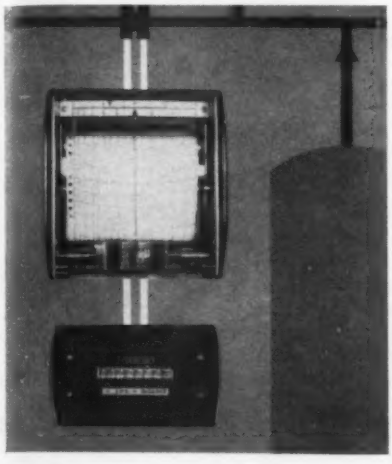
Receiver-integrator

This new receiver-integrator for graphic panels is for use with the company's line of compact consotrol instruments. A pneu-

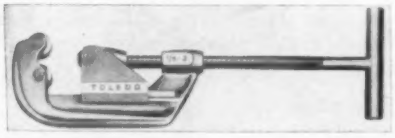


matic-electric instrument, the unit computes a continuous total of any process flow and operates a small counter located in the graphic display. The integrator consists of two small, self-contained units: a remote counter and a flow receiver. In operation, pneumatic measurement signals (3-15 psi) from a flow transmitter at the process are received by the bellows which positions the cam-switch mechanism. The cam-switch then produces an impulse to actuate the counter in constant relation to the flow measurement. Integrators are available for uniform or square root scales to totalize minute, hourly or daily rates. Developed chiefly for graphic-type panels, the unit is suited to control cabinet installations.

Type 224 Receiver-Integrator. The Foxboro Co., Foxboro, Mass.

Pipe cutter

Designed to produce clean smooth cutoffs, according to the manufacturer, this new cutter is of the wheel and roller type.

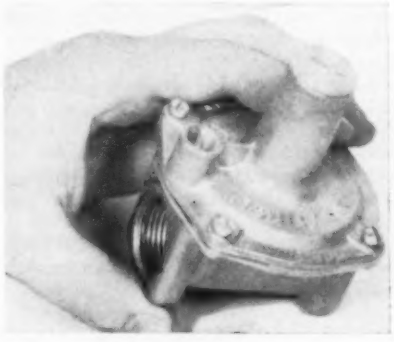


Capacity is given as ⅛" to 2" pipe. Features that aid the cutting operation include: simple design, malleable frame guaranteed warp-proof, and high alloy steel cutter wheels which, the company states, leave practically no burr. Rollers in hook provide a square base when starting tool on pipe. Single cutter wheel is in the sliding block.

Toledo Pipe Threading Machine Co., Toledo, O.

Gas regulator

Designed for normal operation with a vent breather hole which will pass less than 1 cfh/hr in case of diaphragm failure, this new gas regulator unit is said to feature excellent lock up and pilot flow regulation characteristics. Application on ranges is said to be good by the manufacturer because it is capable of controlling pilot flows only when all the burners are shut off, yet still has adequate capacity for the full range input. Construction is compact, with a non-metallic resilient valve seat. All



parts are accessible by removing the top cover. The unit is primarily for use on domestic ranges, water heaters, floor furnaces, wall heaters, room heaters, low capacity central heating furnaces, and industrial burner pilot controls.

Maxitrol Model RV-41 Gas Pressure Regulator. Maxitrol Co., 12200 Beech Rd., Detroit 20, Mich.

Plugging device

This high pressure pipe plugging device is said to be a simple effective unit which can be inserted into a pipeline through a tapped side opening, providing the equivalent of a temporary gate valve at any location. In operation, a hole is tapped through

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Gas Fundamentals

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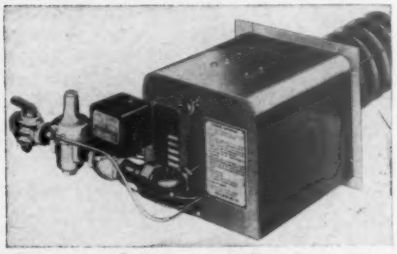
the pipe wall using approved techniques. The tapping machine is then removed from the tapping valve and the unit installed in its place. The company reports that turning the crank is all that is required to move the sealing element into the line where it automatically seats adjacent to the tapped hole. When used in pairs, complete sections of pipe, or valves or fittings, may be removed and replaced between the units, the company reports. By-pass connections are provided so that operations may often be continued while repairs and additions are going on. After completion the tapping valve can be removed, leaving a blinded flange on the pipeline.

Stopple Plugging Device. T. D. Williamson, Inc., P.O. Box 4038, 2733 E. Latimer St., Tulsa 9, Okla.

Conversion burner

A new radiant inshot-type conversion gas burner for domestic and light commercial heating, this burner is adaptable to

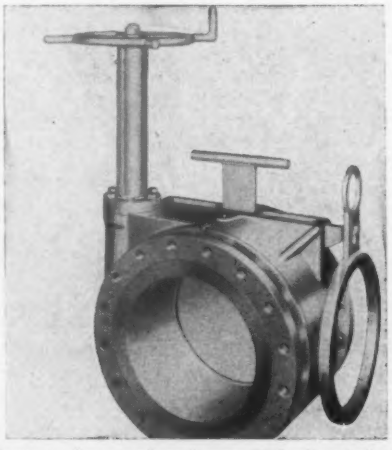


almost any furnace or boiler the company reports, but is especially suited to installation in units designed for firing with flange-mounted oil burners. In such units, the burner is mounted in the opening provided for the oil burner draft tube; when it is installed in conventional furnaces and boilers, a refractory combustion chamber is necessary to insulate the furnace base and floor from heat. Models for firing with natural, mixed, manufactured, or LP-air gases have an AGA input rating of 225,000 Btu; with straight LP gas the burner is rated at 150,000 Btu. These input ratings may be adjusted downward on all models to a minimum of 60,000 Btu.

Radiant Inshot-Type Conversion Gas Burner. Iron Fireman Mfg. Co., Cleveland 10, O.

Blind valve

Production of 14″ and 16″ sizes of the manufacturer's rigid-type line blind valves has been announced, where previously the

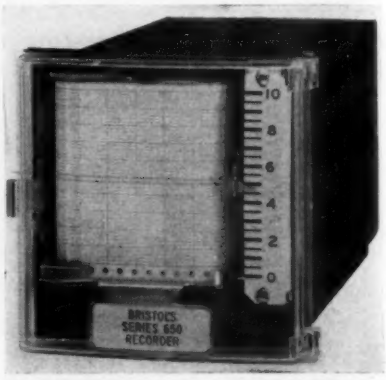


largest size produced was 12″. Created to accommodate larger pipe lines, the new rigid blind employs an internal expansion principle which eliminates spreading the line in even the slightest degree. Where conditions prevent spreading the line, these valves provide positive permanent shut-off. The new blinds, available in carbon steel and other materials, are handwheel operated, the company reports, to afford added leverage in clamping or releasing the spectacle plate. The spectacle plate is made in two sections, one for full-open and one for permanent shut-off of the line. A hanger is provided on the side of the valve to carry the section of the spectacle plate not in use.

Rigid-Type Line Blind Valves, 14″ and 16″. Hamer Oil Tool Co., 2919 Gardenia Ave., Long Beach 6, Cal.

Metagraphic instrument system

A new three-part pneumatically-operated instrument system has been introduced by the manufacturer. In these instruments each of the basic functions performed is packaged separately. Units are: a transmitter, a receiver—recorder or indicator—and a controller. Each unit can be installed on the process at the point where it operates best, providing a flexibility of application. The metagraphic instruments measure, indicate, record, and control pressure, vacuum, temperature, liquid level, differential pressure, and flow. A universal 3-15 psi air pressure signal interconnects the three units no matter what variable is being transmitted. Strip-chart recorders, and indicators are interchangeable without loss of signal or control. Controllers are



offered in five models of control, including cut-off, proportional, proportional plus reset, proportional plus derivative, and proportional plus reset plus derivative.

Bristol Metagraphic System. The Bristol Co., Waterbury 20, Conn.

Control drive

Gas and liquid flow regulation may be improved, the company reports, by use of its small, pneumatically-operated control drive. Butterfly valves, dampers and feeders may be operated on a straight-line flow characteristic. A pneumatic signal actuates a positioning relay which in turn accurately positions a piston-operated drive lever arm. The drive measures 10″ by 11″ by 19″ and may be installed in any position on a column, pipe or flat surface. Time required for full travel, 75°, is adjustable. The drive

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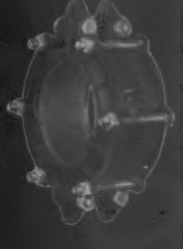

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Bailey Control Drive. Bailey Meter Co., 1050 Ivanhoe Rd., Cleveland 10, O.

NEW BOOKS

A Selected and Annotated Bibliography of Natural Gas. By Richard C. Henshaw, Jr.

This new book presents a selected and annotated bibliography of natural gas under the general headings of: Economics of Natural Gas; Natural Gas Liquids; Petrochemicals; Reserves; Transportation and Storage; Taxation; Public Control; Conservation; and Competitive Fuels.

Pp. 61. Bureau of Business Research, The University of Texas. $1.50.

Glossary of Terms Used in Petroleum Refining. By the Division of Refining, American Petroleum Institute.

This glossary of petroleum terminology is a compilation, with definitions having been selected from published sources and is not a complete treatment of the subject. It has been limited to terms commonly encountered in the refining branch of the petroleum industry. In selecting the definitions which do appear, every effort was made to select those which are in accord with the general meaning or understanding of the term. The definitions are intended for general, rather than technical, usage, and are not to be construed as authoritative or specific definitions for legal usage.

The appendix of the volume features both the Gregg and Pitman shorthand outlines for all of the terms that are found in the glossary.

Pp. 188 + vi. American Petroleum Institute, Division of Refining, 50 W. 50 St., New York 20, N. Y. Cloth bound, $6.00, paper bound, $3.00.

Displacement Gas Meters—Operating, Testing and Repairing.

Out of publication in recent months, the company has announced that it has been reprinted. [See *American Gas Journal*, September, 1952, for description.]

Pp. 275. Publication Department, American Meter Co., Erie, Pa. Published price, $4.50.

Preparing for the Utility Rate Case. Edited and compiled by Francis X. Welch.

This book deals entirely with the various phases of preparation involved in a public utility rate case. The tome, which will be followed by a companion volume dealing with the actual conduct of the trial of a rate case, is designed to assist management people who have the responsibility of starting the rate case preparation, as distinguished from attorneys who must carry it through subsequent phases of formal procedure. Various readers will probably find the book is equally valuable to utility lawyers and their rate case opponents as well as consultants, expert witnesses, regulatory commissioners, company executives, directors, junior officials, commission and company staffs, and any one whose duties or special interests may be involved in the preparation and subsequent trial of a public utility rate case.

The author's method of preparing the volume was to make a selection of hand-picked representative rate cases involving various kinds of public utilities. Mr. Welch then assembled the complete records of each case, plus letters, memoranda and other informal data. Essentially, therefore, the book is a compilation, an assembling of the viewpoints of the different professional specialists whose individual efforts should add up to the sum total of good rate case preparation.

Pp. 323 + xi. Public Utilities Reports, Inc., Washington, D. C. $10.00.

The Business Founding Date Directory. By Etna M. Kelley.

A handbook for those interested in American business history, this book is divided into alphabetical and chronological sections and gives the founding years of over 9,000 companies established before 1916, with 120 dating back to the 1700s or earlier. To learn when a given company started in business, the reader consults the alphabetical section. The chronological section lists groups of companies by founding year. Added parenthetically to many of the listings in the alphabetical section are appropriately descriptive and informative notes—company is oldest in its field, nation, state or city; still operated by members of founding family.

Pp. 228 + x. Morgan & Morgan Publishers, High Point Rd., Scarsdale, N. Y. $10.00.

Heating Ventilating Air Conditioning Guide of 1954. By The American Society of Heating and Ventilating Engineers.

The 32nd edition of The Guide, with 1,128 pages of technical text, this valuable work offers new features that include a chapter on residential summer air conditioning, new data on methods of obtaining local relief in hot humid environments, recent developments in industrial air and gas cleaning, and many other changes made necessary by recent developments in the heating and air conditioning field. Recent research conducted by the American Society of Heating and Ventilating Engineers, or sponsored at leading universities, has influenced changes, revisions and additions to a large proportion of the chapters contained in this book. Other important changes made over earlier editions include new tables on steam requirements of process equipment, and more detailed data on characteristics of pipe and tubing. Also, there has been an extension of the data on the effect of shading of glass and an improved, rewritten chapter on air distribution.

The manufacturers catalog data section, 486 pages, describes and illustrates products of 319 manufacturers. Chapters brought up to date by major changes include Heating Load, Fuels and Combustion, Chimneys and Draft Calculations, Panel Heating, Pipe, Fittings, Weldings, District Heating, Air Cleaning, Automatic Controls, Electric Heating, and Costs.

Pp. 1,616 + xxiv. The American Society of Heating and Ventilating Engineers, 62 Worth St., New York 13, N. Y. $10.00.

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GAS INDUSTRY CALENDAR

August

23-25 Appalachian gas measurement short course, West Virginia University, Morgantown, W. Va.

27-28 Joint meeting, AGA reserves-A.P.I. reserves-Canadian Petroleum Association reserves committees, Banff, Can.

September

7-10 Pacific Coast Gas Association, Vancouver and Georgia Hotels, Vancouver, British Columbia.

8-10 Mid-West gas school and conference, Iowa State College, Ames, Iowa.

8-11 AGA operating section, organization meetings, Hotel New Yorker, New York.

10 New Jersey Gas Association, Hotel Monmouth, Spring Lake, N. J.

13-14 Independent Natural Gas Association of America, annual meeting, Roosevelt Hotel, New Orleans, La.

17-18 Maryland Utilities Association, fall conference, Virginia Beach, Va.

24 Oklahoma Utilities Association, gas division meeting, Biltmore Hotel, Oklahoma City, Okla.

27-28 International Gas Union council meeting, Dusseldorf, Germany.

28-29 Texas Mid-Continent Oil and Gas Association, Baker Hotel, Dallas.

October

9 AGA board of directors, Atlantic City, N. J.

11-13 AGA annual convention, Atlantic City, N. J.

18-22 National Safety Council, Chicago.

November

1-5 National Metal Exposition, Chicago.

4 Midwest Industrial Gas Council, fall meeting, La Salle Hotel, Chicago.

8-11 American Petroleum Institute, Conrad Hilton Hotel, Chicago.

8-12 National hotel exposition, Kingsbridge Armory, New York.

17-19 Wisconsin Utilities Association, gas and electric sections convention, Schroeder Hotel, Milwaukee, Wis.

17-19 Southeastern Gas Association, Sir Walter Hotel, Raleigh, N. C.

28-December 3 The American Society of Mechanical Engineers, Statler Hotel, New York.

December

6-7 SGA advisory council and management conference, Point Clear, Ala.

January, 1955

13-20 National housewares & home appliance exhibits, Navy Pier, Chicago.

February, 1955

7-11 Western winter radio-television and appliance market, Western Merchandise Mart, San Francisco.

March, 1955

7-9 Mid-West Gas Association, St. Paul Hotel, St. Paul, Minn.

24-25 AGA gas supply, transmission and storage conference, Wm. Penn Hotel, Pittsburgh.

24-25 Oklahoma Utilities Association convention, Mayo Hotel, Tulsa, Okla.

April, 1955

12-14 AGA sales conference on Industrial and commercial gas, Hotel Statler, Boston, Mass.

12-15 AGA distribution, motor vehicles and corrosion conference, Netherland Plaza, Cincinnati, O.

19-21 Southwestern gas measurement short course, University of Oklahoma, Norman, Okla.

25-27 Mid-West regional gas sales conference, Edgewater Beach Hotel, Chicago.

May, 1955

9-13 National restaurant exposition, Navy Pier, Chicago.

16-18 Southern Gas Association, New Orleans, La.

23-25 GAMA annual meeting, Ambassador Hotel, Los Angeles.

June, 1955

5-9 Canadian Gas Association, annual meeting, General Brock Hotel, Niagara Falls, Ontario, Canada.

9-10 Natural Gas and Petroleum Association of Canada, Royal Connaught Hotel, Hamilton, Ontario, Canada.

26-29 Michigan Gas Association, Grand Hotel, Mackinac Island, Mich.

July, 1955

18-22 Western summer radio-television and appliance market, Western Merchandise Mart, San Francisco.

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